See Exhibit D for detailed guidance on the preparation of this attachment. There is no page limitation for Attachment 8; however, applicants are encouraged to be clear and concise.

Benefits derived from the Proposal may extend beyond the water supply benefits described in Attachment 7 (see above). This attachment allows applicants to claim benefits other than water supply benefits. Qualitative analysis is acceptable if it is not feasible to quantify the benefits and the applicant provides adequate justification.

Note that commitment to providing the water quality and other expected benefits will become a term of the grant agreement if the Proposal is selected for funding.

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Ventura County Regional Urban Landscape Efficiency (R-1)

Summary

The Ventura County Regional Urban Landscape Efficiency Program (VC-RULE) is a regional partnership of nine water agencies in Ventura County focused on reducing urban landscape water use by improving irrigation efficiency. To maximize water savings, the project "bundles" landscape irrigation surveys, which assess irrigation system performance but do not lead directly to water savings, with one of three tiers of irrigation system upgrades. All landscapes that receive an irrigation survey will receive, at a minimum, minor adjustments and irrigation system reprogramming to improve water use efficiency. The second tier of properties will receive rain shut-off sensors and low-precipitation-rate irrigation nozzles, which apply irrigation water at a lower rate to allow better infiltration into the soil, reducing runoff and the total amount of water that must be applied to the landscape. Larger landscapes, for which the savings are most cost effective, will receive weather-based irrigation controllers (WBICs), which automatically adjust irrigation schedules in response to weather conditions, providing only the water needed by the landscape. This project will reduce water demand and, as a result, reduce the region's dependency on imported water sources. In addition, by reducing overwatering, water quality will also be improved. Table 1 provides an overview of costs and benefits presented in Attachments 7 and 8. The remainder of this attachment discusses the water quality and other benefits.

The "Without Project" Baseline

Without the project, the project proponents will continue to serve potable water to meet irrigation demands for the 1,091 sites for irrigation efficiency improvements under the project. Table 2 lists each retail agency included in the project, the communities they serve, and their marginal water source. All but one participating agency imports water from the State Water Project (SWP), impacting the environmentally stressed San Francisco Bay-Delta. Such water imports also contribute to significant energy use and carbon emissions, which will continue unabated without this project.

Runoff from overwatering landscapes in the participating agencies' service areas currently ponds in streets and gutters and runs to local retention basins. Stagnant water in these areas is hard to drain and contributes to mosquito problems. The runoff contains fertilizers and pesticides that have been applied to the landscapes, along with other pollutants including salts, pathogens, and fecal coliforms. The runoff from seven of the nine participating agencies' service areas eventually drains to Calleguas Creek, which suffers the most water quality impairments of any watershed in Ventura County. Calleguas Creek is 303d listed for chloride, total dissolved solids (TDS), sulfate, boron, toxicity, sediment toxicity, organophosphate pesticides, chlorpyrifos, copper, nickel, mercury, zinc, and selenium.

In addition, the Casitas Municipal Water District (Casitas) service area drains to the Ventura River, which is 303d listed for nutrients and trash (State of California, 2010). In addition to draining into Calleguas Creek, the City of Oxnard service area also drains into Reach 2 of the Santa Clara River, and into the Channel Islands Watershed. The Santa Clara River is 303d listed for toxicity in Reach 1 which empties into the estuary. The Channel Islands Watershed does not have any 303d listings. The Lake Sherwood Community Services District service area drains into Malibu Creek in the Santa Monica Bay Watershed. Malibu Creek is 303d listed for coliform bacteria, nutrients (algae), scum/foam unnatural, sedimentation/ siltation, selenium, sulfates, and trash. Without the project, pollution from irrigation runoff will continue. With continued import of SWP water comes the continued import of salts into the basin.

Table 1: Benefit-Cost Analysis Overview

	Present Value
Costs – Total Capital and O&M	$1,040,208
Monetizable Benefits	
Water Supply Benefits	
Avoided Imported Water Cost	$968,331
Avoided Local Surface Water Cost	$11,203
Total Monetized Benefits	$979,534
Qualitative Benefit or Cost	**Qualitative indicator***
Water Quality and Other Benefits	
Reduced Pollution from Dry-Weather Irrigation Runoff	+
Avoided Introduction of Additional Salts into Basin	+
Reduced Carbon Dioxide Emissions	+
Reduced Stress on the Bay-Delta	+
Increased Water Conservation Education	+
Reduced Street Maintenance Costs	+

Notes:

O&M = operations and maintenance.

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

Table 2: VC-RULE Water Agencies, Water Source, and Watershed

Utility Name	Marginal Water Source	Major Watersheds
Casitas Municipal Water District	Local Surface Water	Ventura River
Camrosa Water District	State Water Project	Calleguas Creek
City of Camarillo Water Division	State Water Project	Calleguas Creek
City of Oxnard	State Water Project	Calleguas Creek, Santa Clara River, Channel Islands
City of Simi Valley/ County Waterworks District No. 8	State Water Project	Calleguas Creek
Ventura County Waterworks District No. 1	State Water Project	Calleguas Creek
Ventura County Waterworks District No. 17	State Water Project	Calleguas Creek
Ventura County Waterworks District No. 19	State Water Project	Calleguas Creek
Lake Sherwood Community Services District	State Water Project	Santa Monica Bay

Water Quality and Other Benefits

The project will provide water quality benefits as well as other benefits. This section provides discussion and details on estimation of these benefits, including avoided introduction of additional salts into the basin, reduced CO_2 emissions, increased water conservation education, reduced pollution from dry-weather irrigation runoff, reduced stress on the Bay-Delta, and reduced street maintenance costs.

Reduced Pollution from Dry-Weather Irrigation Runoff

Runoff from landscape irrigation is a significant source of dry weather nonpoint source pollution in urban environments. The use of WBICs will reduce runoff from landscapes that are currently overwatered and/or have a significant amount of overspray onto sidewalks, driveways, streets, and other hard surfaces due to poor design and/or maintenance. This will reduce the resulting dry-weather irrigation runoff, which carries fertilizers, pesticides, and other pollutants into the storm drain system and/or into local creeks and rivers. According to a study conducted by the Municipal Water District of Orange County and the Irvine Ranch Water District (MWDOC and IRWD, 2004), the installation of WBICs reduced runoff by 50 percent compared to post-intervention runoff and 71 percent compared to a control group. The study also noted that a reduction in the volume of runoff did not increase the concentration of pollutants in the runoff. This means that the reduction in total pollutants transported through runoff will likely be possible through a reduction in total runoff. Reduced runoff will reduce loading of fertilizers and pesticides that have been applied to the landscapes, along with other pollutants including pathogens, coliform bacteria and salts.

Reduced runoff that will result from this project will in turn reduce areas of ponded water in gutters and local retention basins, which will lessen problems with mosquito breeding.

Avoided Introduction of Additional Salts into Basin

By conserving water and avoiding current purchases of imported SWP water, the introduction of additional TDS, which are commonly referred to as salts or salinity, into Ventura County groundwater and surface water is avoided. SWP water, which is imported from outside of the basin, contains salts and related constituents. When this water is used in the basin, those salts remain behind. Avoiding SWP water imports through conservation efforts will effectively prevent the import of additional salts.

The average TDS concentration in SWP water is approximately 250 milligrams per liter (mg/L) (Metropolitan, 2005). Therefore, each acre-foot of SWP water contains, on average, 0.308 tons of salt per acre-foot. By eliminating use of 1,351 acre-feet (AF) of imported SWP water over the projected 13-year life of the project, the introduction of approximately 416 metric tons of salts into Ventura County's Watersheds will be avoided.

Reduced CO_2 Emissions

By offsetting imported water demands with conservation efforts, the project will avoid emissions of CO_2 (carbon dioxide, a green-house gas) generated by the production of energy required to transport SWP water to Ventura County. Calleguas prepared an analysis in 2007 that estimates the CO_2 emissions associated with delivery of imported water to Ventura County. Calleguas estimates that the CO_2emissions rate for all electricity sources providing electricity to the SWP is 0.443 tons of CO_2 per MegaWatt-hr (MWh) (Calleguas, 2007).

Based on information from the pumping plants used to move water into Ventura County, Calleguas estimates that the electricity required for the conveyance of 1 acre-foot of imported SWP water is 4.053 MWh (Calleguas, 2007). When energy requirements at the Jensen Filtration Plant are taken into account, the total amount of energy required for each acre-foot of water delivered to Ventura County amounts to 4.09 MWh.

Given the calculated weighted average of CO_2 emissions of 0.443 tons emitted per MWh, 1.81 tons of CO_2 are produced for every acre-foot of water delivered to the Calleguas service area. By eliminating use of 1,351 AF of imported SWP water over the project life, emission of 2,445 metric tons of CO_2 will be avoided.

Reduced Stress on the Bay-Delta

By conserving water used for irrigation, the project will offset SWP water imports. This water can be left as instream flows in the Bay-Delta or can be used to offset other diversions that may otherwise reduce flows. Reduced demands on Delta supplies also will help

reduce the overall salinity of the Delta and improve Delta habitat.

Maintaining the Delta's environmental condition is vital to maintaining and improving the viability of the region. The Delta provides drinking water to 25 million people, supports irrigation of 4.5 million acres of agriculture, and serves as a home to 750 plant and animal species. The Delta's 1,600 square miles of marshes, islands and sloughs support at least half of the migratory water birds on the Pacific flyway, 80 percent of California's commercial fisheries and recreational uses, including boating, fishing and windsurfing.

Delta resources are in a state of crisis. Fish populations, including salmon and Delta-smelt, have declined dramatically in recent years. The levee system is aging, and vulnerability of the Delta to flooding, sea-level rise, or a major earthquake have contributed concerns about possible levee collapse. Local efforts to offset imported water demands such as with water conservation will cumulatively contribute to reducing stresses on the Bay-Delta.

Increased Water Conservation Education

The project will provide education on the benefits from reducing overwatering of lawns and the mechanics of how to reduce irrigation by maintaining healthy lawns using weather-based controllers and other methods. During a landscape irrigation survey, water customers are educated about the importance of actively maintaining their irrigation systems, both to reduce water waste and save on their water bills. Customers can also be introduced to the agencies' other water conservation programs during the survey, creating a greater opportunity for water conservation. Due to the uncertainty associated with the landscapes to be selected for the project, it is not possible to accurately predict the number of persons who will benefit from increased water conservation education.

Reduced Street Maintenance Costs

The project will reduce street maintenance costs by reducing the amount of dry-weather runoff to streets in the participating agencies' service areas. The project will reduce ponding on streets and minimize the effect of moisture in creating potholes and cracks, which comprise a significant portion of street maintenance costs.

Distribution of Project Benefits and Identification of Beneficiaries

Nine water agencies representing Ventura County's three main watersheds have partnered to establish this regional landscape water use efficiency program. The majority of benefits will accrue to these nine agencies and their customers. However, reduced demand for imported water from the SWP will have benefits for the sensitive ecosystems in the San Francisco Bay-Delta. Table 3 shows a breakdown of project beneficiaries.

Table 3: Project Beneficiaries Summary

Local	Regional	Statewide
Camrosa Water District	Calleguas Municipal Water District	San Francisco Bay-Delta
Casitas Municipal Water District	Metropolitan Water District of Southern California	
City of Camarillo Water Division		
City of Oxnard		
City of Simi Valley/County Waterworks District No. 8		
Ventura County Waterworks District No. 1		
Ventura County Waterworks District No. 17		
Ventura County Waterworks District No. 19		
Lake Sherwood Community Services District		

Project Benefits Timeline

Project implementation will take place over a 32-month period between October 2011 and May 2014. WBICs and rain shut-off sensors are expected to have an average lifetime of 10 years, which is the longest device lifetime used in this project. The benefits of this project are expected to cover 13 years, which allows phase-in of implementation over the first three years and phase-out of benefits at the end of the project. However, some of the water efficiency upgrades planned for this project have a shorter lifetime. For instance, the benefits that accrue from landscape irrigation surveys/adjustments/reprogramming and low-precipitation-rate nozzles are anticipated to have a 5-year lifetime. The appropriate lifetime is applied to each water efficiency measure to be installed when calculating benefits for the project.

Potential Adverse Effects from the Project

VC-RULE is categorically exempt under the California Environmental Quality Act (CEQA) under CEQA Guidelines, Section 15061 (b) (3 Therefore, no adverse effects are anticipated from this project.

Summary of Findings

The project will provide a range of both water quality and other benefits. Reduced use of SWP water will avoid importation of 416 metric tons of salts over the 13-year life of the project. In addition, reduced use of SWP water imports will prevent the generation of 2,445 metric tons of CO_2 over the 13-year life of the project.

Additional qualitative benefits from the project are summarized in Table 4. Identified qualitative benefits include reduced pollution from dry-weather irrigation runoff into storm drains and local waterways, reduced stress on the Bay-Delta from reduced SWP demands, reduced street maintenance costs from ponding of irrigation runoff, and increased water conservation education. Each benefit is expected to increase the overall net monetized benefits of the project, if they could be monetized.

Table 4: Qualitative Benefits Summary – Water Quality and Other Benefits

Benefit	Qualitative Indicator
Reduced Pollution from Dry-Weather Irrigation Runoff	+
Avoided Introduction of Additional Salts into Basin	+
Reduced Carbon Dioxide Emissions	+
Reduced Stress on the Bay-Delta	+
Increased Water Conservation Education	+
Reduced Street Maintenance Costs	+

Note:

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.

The water quality and other benefits identified in this analysis could not be monetized, but three of them could be quantified. This quantification is based on available data and some assumptions. As a result, there may be some omissions, uncertainties, and possible biases. In this analysis, the main uncertainties are associated with assumptions about the carbon intensity of the electricity sources used to move SWP water and the number of people per household that will receive some level of education from landscape irrigation surveys. These issues are listed in Table 5.

Table 5: Omissions, Biases, and Uncertainties and Their Effects on the Project

Benefit or Cost Category	Likely Impact on Net Benefits*	Comment
Reduced Carbon Dioxide Emissions	U	Real reductions in carbon emissions are anticipated by avoiding SWP imports. However, the carbon intensity of the electricity sources used to move SWP water could change over time.
Number of Persons Per Household	U	The number of persons per household that receive education is likely to be vary over time.

Notes:

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

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Table 16 - Water Quality and Other Expected Benefits

(All benefits should be in 2009 dollars)

Project: Ventura County Regional Urban Landscape Efficiency Program (R-1)

(a) Year	(b) Type of Benefit	(c) Measure of Benefit (Units)	(d) Without Project	(e) With Project	(f) Change Resulting from Project (e) – (d)	(g) Unit $ Value (1)	(h) Annual $ Value (f) x (g) (1)	(i) Discount Factor (1)	(j) Discounted Benefits (h) x (i) (1)
2009	Avoided Salts	Metric Tons	0	0.0	0.0				
	Avoided CO2	Metric Tons	0	0.0	0.0				
2010	Avoided Salts	Metric Tons	0	0.0	0.0				
	Avoided CO2	Metric Tons	0	0.0	0.0				
2011	Avoided Salts	Metric Tons	0	5.8	5.8				
	Avoided CO2	Metric Tons	0	33.8	33.8				
2012	Avoided Salts	Metric Tons	0	28.8	28.8				
	Avoided CO2	Metric Tons	0	169.2	169.2				
2013	Avoided Salts	Metric Tons	0	51.8	51.8				
	Avoided CO2	Metric Tons	0	304.5	304.5				
2014	Avoided Salts	Metric Tons	0	61.4	61.4				
	Avoided CO2	Metric Tons	0	360.9	360.9				
2015	Avoided Salts	Metric Tons	0	61.4	61.4				
	Avoided CO2	Metric Tons	0	360.9	360.9				
2016	Avoided Salts	Metric Tons	0	57.7	57.7				
	Avoided CO2	Metric Tons	0	339.1	339.1				
2017	Avoided Salts	Metric Tons	0	42.8	42.8				
	Avoided CO2	Metric Tons	0	251.8	251.8				
2018	Avoided Salts	Metric Tons	0	28.0	28.0				
	Avoided CO2	Metric Tons	0	164.5	164.5				
2019	Avoided Salts	Metric Tons	0	21.8	21.8				
	Avoided CO2	Metric Tons	0	128.2	128.2				
2020	Avoided Salts	Metric Tons	0	21.8	21.8				
	Avoided CO2	Metric Tons	0	128.2	128.2				
2021	Avoided Salts	Metric Tons	0	19.8	19.8				
	Avoided CO2	Metric Tons	0	116.2	116.2				
2022	Avoided Salts	Metric Tons	0	11.6	11.6				
	Avoided CO2	Metric Tons	0	68.1	68.1				
2023	Avoided Salts	Metric Tons	0	3.4	3.4				
	Avoided CO2	Metric Tons	0	20.0	20.0				
Project Life	Avoided Salt Imports			416.1	416.1				
Project Life	Avoided CO2 emission			2,445.3	2,445.3			…	

Total Present Value of Discounted Benefits Based on Unit Value
(Sum of the values in Column (j) for all Benefits shown in table)
Transfer to Table 20, column (f), Exhibit F: Proposal Costs and Benefits Summaries

Comments: There are no "Water Quality and Other Expected Benefits" that can be monetized.

Calleguas Regional Salinity Management Pipeline, Phase 2A (C-14)

Summary

To address increasing salinity levels, including compliance with Total Maximum Daily Loads (TMDL), and water supply issues in the Calleguas Creek Watershed (Watershed), the Calleguas Municipal Water District (Calleguas) is developing the Calleguas Regional Salinity Management Pipeline (SMP). The SMP is a 32-mile-long pipeline system that will convey concentrate from local brackish groundwater desalters and excess recycled water from municipal wastewater treatment plants (WWTPs) to different areas in the Watershed for direct use (e.g., for agricultural and environmental purposes). When pipeline flows (both concentrate and excess recycled water) cannot be used downstream, the flows will be discharged into the Pacific Ocean through the Hueneme Outfall. To date, approximately 7 miles of the SMP have been completed under Phase 1 of project implementation with an additional 2 miles to be completed by the end of 2011. Funding is currently being sought under this Proposal for Phase 2A, which includes the construction of 12,000 linear feet (about 2.25 miles) of 30-inch-diameter pipe.

The primary source of discharge to the SMP will be a series of brackish groundwater desalters. Together, the desalters will produce approximately 46,000 acre-feet per year (AFY) of desalted groundwater for municipal, industrial, and agricultural uses, thereby reducing demand for water imported from the Bay-Delta region through the State Water Project (SWP). It is anticipated that one or more agricultural desalters, which will provide 5,767 AF of water per year for irrigation purposes, will be connected to Phase 2A in the future. Future phases of the project will extend the pipeline further into the Watershed, enabling the connection of an estimated six additional desalters.

In addition to the desalters, several municipal WWTPs will also be connected to the SMP. The WWTPs will discharge highly treated wastewater effluent (i.e., recycled water) during times of the year when the supply of recycled water exceeds demand in the local area. The CamSan/Camrosa Recycled Water Interconnection Pipeline (RW Interconnection) (C-15), another project included in this Proposal, is the first recycled water system that plans to discharge to the SMP. At full implementation, the RW Interconnection will discharge approximately 5.4 million gallons of recycled water to the SMP on an estimated 30 days of the year, discharging a total of 500 AFY. The number of WWTPs (and associated amount of recycled water) that will ultimately discharge to the SMP is currently unknown.

A summary of all benefits and costs of the project is provided in Table 6. Water quality and other expected benefits are discussed in the remainder of this attachment.

Table 6: Benefit-Cost Analysis Overview

	Present Value
Costs – Total Capital and O&M	$12,975,417
Monetizable Benefits	
Water Supply Benefits	
Avoided Imported Water Supply Costs	$21,173,300
Total Monetizable Benefits	$21,173,300
Qualitative Benefit or Cost	**Qualitative Indicator***
Water Supply Benefits	
Increased Local Water Supply Reliability for Calleguas Customers	++
Improved Operational Flexibility for Calleguas and Metropolitan	+
Water Quality and Other Benefits	
Salt Removal and Avoided Introduction of Salts into the Watershed	++
Improved Groundwater Quality	++
Reduced Carbon Dioxide Emissions	++
Reduced Stress on the Bay-Delta	+
Improved Water Quality and Ecological Value in Mugu Lagoon	+
Increased Ecological Value at Ventura County Game Preserve	+
Increased Recreation Value at Ventura County Game Preserve	+
Agricultural Benefits	+

Notes:

O&M = operations and maintenance.

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

The "Without Project" Baseline

Along its route, the SMP will pass through the cities of Simi Valley, Moorpark, Camarillo, Oxnard, and Port Hueneme and through portions of unincorporated Ventura County. Calleguas Creek and its major tributaries, Revolon Slough, Conejo Creek, Arroyo Conejo, Arroyo Santa Rosa, and Arroyo Simi, drain an area of 343 square miles in southern Ventura County and a small portion of western Los Angeles County. Major water bodies downstream of the project include Calleguas Creek and Mugu Lagoon, which is located at the mouth of the Watershed.

Land uses in the Watershed include urban development in the cities of Simi Valley, Moorpark, Thousand Oaks, and Camarillo, with additional residential development along some of the Watershed's slopes. Agricultural cultivation of orchards and row crops occurs along valleys and on the Oxnard Plain near the coast. Other beneficial uses identified upstream of the estuary include wildlife habitat, contact and noncontact water recreation, industrial service and process supply, preservation of rare and endangered species, groundwater recharge, wetlands habitat, freshwater replenishment, and warm-water habitat. Beneficial uses identified in the estuary include wildlife habitat, contact and noncontact recreation, estuarine habitat, marine habitat, preservation of rare and endangered species, navigation, preservation of biological habitats, wetland habitat, migratory and

spawning habitat, and shellfish harvesting (RWQCB, 2010).

Most of the soils, surface water, and groundwater in the Watershed contain high levels of salts, including total dissolved solids (TDS), boron, sulfate, and chloride. Primary sources of salts in surface water and groundwater include imported surface water (i.e., SWP supplies), fertilizer use in agricultural activities, and discharges from wastewater plants. Salts continue to accumulate and, currently, the mass of salts and minerals coming into the region is greater than the mass of salts and minerals leaving the region.

The accumulation of salts due to historic and ongoing point and nonpoint source pollution poses a number of problems for beneficial uses within the Watershed, including municipal, industrial, and agricultural water supply and habitat. Currently, most groundwater users must blend imported water with the groundwater in order to lower salt concentrations to meet drinking water standards. Increased quantities of water imported through the SWP place additional burden on the already-stressed Bay-Delta region. Rising salinity is also harmful to agriculture, primarily for growers of high-value strawberries and avocados who are increasingly unable to use local surface water or groundwater for irrigation without reducing agricultural productivity. High salinity levels in soils and surface water can also be detrimental to sensitive habitat and can have damaging effects on ecosystems in the Watershed.

As a result of these factors, several TMDLs have been established for the Watershed. These include salts (boron, chloride, sulfate, and TDS), nutrients, metals, toxics for pesticides and polychlorinated biphenyls, and toxicity. Calleguas Creek is currently 303d listed for salts, toxicity, sediment toxicity, organophosphate pesticides, chlorpyrifos, copper, nickel, mercury, zinc, and selenium (RWQCB, 2010).

Without the SMP, local water suppliers could not construct brackish groundwater desalters, as there will be no cost-effective mechanism for concentrate disposal. Underutilized groundwater supplies will remain unused and dependence on imported water supply will increase, negatively affecting the Bay-Delta ecosystem. Salts will continue to concentrate in the Watershed and TMDLs will be more difficult, if not impossible, to achieve. The use of SWP water will also result in the import of additional salts into the Watershed.

Water Quality and Other Benefits

The project will provide a range of water quality and other benefits. This section provides a discussion for these benefits, including removal of salts from the Watershed and avoided introduction of additional salts into the Watershed, improved groundwater quality, reduced CO_2 emissions, reduced stress on the Bay-Delta, and other ecological and recreational benefits.

As described in Attachment 7, the benefits described here are partially attributable to the desalters and partially attributable to the SMP itself. This is because neither project can exist and provide benefits without the other. As described in Attachment 7, benefits are allocated across SMP-related projects based on each project's percentage of total SMP-related project costs.

Salt Removal and Avoided Introduction of Salts into the Watershed

At full implementation of the desalters, the SMP will enable the removal of close to 95,000 metric tons (MT) of salt from the Watershed each year. This will amount to the export of more than 2.9 million MT of salts through 2049. As described in Attachment 7, only a portion of this benefit is attributable to the SMP itself. When this benefit is allocated across the SMP projects (based on a percentage of total project cost each year), the SMP is credited for the removal of 96,558 MT of salts over the life of the project.

The SMP and the desalters will also allow the Watershed to avoid the accumulation of more than 14,368 MT of salt per year by offsetting the import of 46,650 AFY of SWP water. Through 2049, the SMP-related projects will avoid the import (via SWP water) of more than 431,000 MT of salts. Of this total, the avoided introduction of 13,842 MT of salts is directly attributed to the SMP.

Together, the export of salts from the Watershed via the SMP, and the avoided introduction of salts into the Watershed due to reduced reliance on SWP water, will reduce the amount of salts in the basin by 110,400 MT over the life of the project.

The removal of salts from the Watershed is based on the assumption that the future SMP desalters will produce 11 million gallons of concentrate per day (12,320 AFY) and that the concentrate will have an average salt concentration of 6,250 milligrams per liter (mg/L), or 7.71 MT of salt per acre-foot. To calculate the avoided import of salts due to reduced imports of SWP water, it is assumed that the average TDS concentration in SWP water is 250 mg/L (Metropolitan, 2005). Therefore, each acre-foot of SWP water contains, on average, 0.308 MT of salts. This analysis assumes that all of the SMP desalters will offset the use of imported SWP water because it is the marginal water source in most communities (i.e., it is typically the most expensive water source).

The removal and avoided introduction of salts into the Watershed as a result of the project will reduce salt loading into Calleguas Creek and improve water quality for beneficial uses.

Improved Groundwater Quality

The management of the brackish groundwater through a combination of extraction, treatment, and natural replenishment will result in improvements to the existing groundwater aquifer. Currently, TDS levels in the Watershed groundwater remain high, exceeding 1,000 mg/L in many areas. Restoration of pumping of the groundwater in this area will make additional groundwater storage available and allow the aquifer to be replenished with higher-quality water (i.e., local runoff). The SMP will thereby improve the quality of the Watershed's groundwater in the area over the long term.

Reduced CO_2 Emissions

By offsetting demands for imported water with locally produced water, the project will avoid emissions of CO_2 [carbon dioxide, a greenhouse gas (GHG)] generated by the production of energy required to transport SWP water to Ventura County. Calleguas prepared an analysis in 2007 that estimates the CO_2 emissions associated with delivery of imported water to Ventura County as well as CO_2 emissions with brackish groundwater desalting. Calleguas estimates that the CO_2 emissions rate for all electricity sources providing electricity to the SWP is 0.443 tons of CO_2/MWh (Calleguas, 2007).

Based on information from the pumping plants utilized in moving water to Ventura County, Calleguas also estimates that the electricity required for the conveyance of 1 acre-foot of imported SWP water is 4.053 MWh (Calleguas, 2007). When energy requirements at the Jensen Filtration Plant are taken into account, the total amount of energy required for every acre-foot of water delivered to Ventura County amounts to 4.090 MWh.

Given the calculated weighted average of CO_2 emissions of 0.443 tons/MWh, 1.81 tons of CO_2 are produced for every acre-foot of water delivered to the Calleguas service area. By eliminating use of 1.4 million AF of imported SWP water over the assumed project life, the SMP-related projects (i.e., the desalters and the pipeline itself) will avoid emission of more than 2.53 million MT of CO_2. This analysis assumes that all of the SMP-related desalters will avoid the use of imported water.

Avoided carbon emissions will be offset to some extent by the energy required at the desalters to pump and treat local groundwater. Power requirements for a low-pressure membrane, reverse osmosis (RO) groundwater pumping and treatment facility are on the order of 1.64 MWh/acre-foot, including pump, motor, and transmission losses (Calleguas, 2007 from AWWA, 1999). Using the method described above, Calleguas estimates CO_2 production associated with RO treatment to be 0.70 tons/acre-foot of water produced. Thus, producing 1.4 million AF of desalted groundwater will result in the emissions of about 980,000 MT of CO_2. The net reduction of CO_2 due to avoided use of SWP water therefore amounts to 1.55 million MT over the life of the project. (2.53 million MT from avoided SWP water use minus 980,000 MT from groundwater desalting equals 1.55 million MT of net avoided CO_2 emissions.) When this benefit is allocated

across all SMP-related projects based on the percentage of total costs, the SMP itself can be attributed for the reduction of 49,885 MT of CO_2 over the life of all SMP-related projects (through 2049).

Reduced Stress on the Bay-Delta

By reducing the use of imported SWP water, this project will augment in stream flows in the Bay-Delta or will offset other diversions that may otherwise reduce flows. Reduced demands on Delta supplies will also help reduce the overall salinity of the Delta and improve Delta habitat.

Maintaining the Delta's environmental condition is vital to maintaining and improving the viability of the region. The Delta provides drinking water to 25 million people, supports irrigation of 4.5 million acres of agricultural land, and serves as home to 750 plant and animal species. The Delta's 1,600 square miles of marshes, islands, and sloughs support at least half of the migratory water birds on the Pacific Flyway, 80 percent of California's commercial fisheries, and recreational uses including boating, fishing, and windsurfing.

Delta resources are in a state of crisis. Fish populations, including salmon and Delta smelt, have declined dramatically in recent years. The levee system is aging, and vulnerability of the Delta to flooding, sea level rise, or a major earthquake has raised concerns about possible levee collapse. Local efforts to develop groundwater and recycled water resources that offset imported water demands, such as with the SMP, will cumulatively contribute to reducing stresses on the Bay-Delta.

Improved Water Quality and Ecological Value in Mugu Lagoon

Mugu Lagoon is located at the terminus of Calleguas Creek. The lagoon is designated an Area of Special Biological Significance and is one of the few remaining significant saltwater wetlands habitats in Southern California (WMI, 2004). Mugu Lagoon is also an important habitat along the Pacific Flyway, a bird migration route running from Alaska south to Mexico. The wetlands are a critical resting area for migratory birds.

Mugu Lagoon faces numerous water quality problems stemming from land use practices, pollutant sources, and sedimentation (WMI, 2004). The SMP will enable the removal of salts from groundwater and surface water, such that the flows in Calleguas Creek are less saline. This will help to improve and support ecological functions in Mugu Lagoon because Calleguas Creek is a primary source of freshwater to Mugu Lagoon.

Increased Ecological Value at the Ventura County Game Preserve

The Ventura County Game Preserve, also known as the Duck Club, is a privately owned area that serves as a wildlife refuge and offers duck hunting during duck season (October through January). The Duck Club currently pumps groundwater to fill ponds on its property and is interested in replacing the brackish groundwater with SMP water. Currently, most of these ponds are only filled in the winter months due to limitations on groundwater pumping for groundwater management purposes. The Duck Club is a potentially attractive SMP water user due to the fact that it has year-round water demand.

The Duck Club contains 463 acres of ponds that could potentially be filled with SMP water: 54 acres are currently filled on a year-round basis; 372 acres are currently filled during the winter months only but could be filled year-round if water were available; and 37 acres are not currently flooded. Calleguas estimates that the total demand at the Duck Club will amount to about 1,800 AFY. There is also the potential for additional water to be stored at the Duck Club for use during times of the year when irrigation water is in high demand (Calleguas, 2001).

Increased Recreation Value at the Ventura County Game Preserve

Currently, recreation at the Duck Club is only possible during the winter months. Nonhunting activity, particularly wildlife viewing, during the rest of the year is a potential benefit, if the 463 acres of ponds could be filled year-round.

Agricultural Benefits

When tertiary-treated effluent is available in the SMP, it will be made available to agricultural users for growing turf grass (sod) or other salt tolerant crops. In 2008, turf farming in Ventura County generated more than $53 million in crop value (Ventura County, 2009). Although turf is relatively insensitive to high salt levels in irrigation water, it is expected that yields may improve with a switch from using groundwater with an average TDS concentration of 27,000 mg/L to using recycled water with a TDS concentration of approximately 1,500 mg/L to 4,000 mg/L, which is made available through the SMP.

Agricultural producers in the area currently pay the energy cost to pump groundwater, plus an extraction fee of $4/acre-foot to the Fox Canyon Groundwater Management Agency. Using SMP water will allow the turf farmers to avoid groundwater-related charges. It is not currently known what farmers will be charged for SMP water. The amount of water that agricultural users will demand from the SMP and the timing of those demands are currently unknown.

Also, the SMP will enable agricultural users to construct desalters for high-quality irrigation water enabling them to grow high value, salt intolerant crops, like berries and tomatoes and utilize less water due to the fact that excess salts will not need to be flushed from the soils and root area.

Distribution of Project Benefits and Identification of Beneficiaries

The SMP includes the full range of types of beneficiaries, as is summarized in Table 7. At the local level, Calleguas customers will benefit from improved water quality due to (1) the removal of salts from the Watershed via the SMP, (2) reduced imports of salts found in SWP water, and (3) improved groundwater quality. In addition, agencies with WWTPs will benefit by avoiding recycled water discharge to Calleguas Creek which facilitates meeting the TMDL for chloride. Regionally, the SMP will result in benefits to agricultural and recreational users who are able to use discharge from the SMP. Regional and statewide ecological benefits and air quality benefits include ecological improvements at the Ventura County Game Preserve, Mugu Lagoon, and the Bay-Delta, and reduced GHG emissions due to reduced imports of SWP water.

Table 7: Project Beneficiaries Summary

Local	Regional	Statewide
Retail Water Agencies Supplied by Calleguas	Ventura County agricultural users	San Francisco Bay-Delta
Wastewater Treatment/Disposal Agencies	Ventura County Game Preserve	
	Mugu Lagoon	

Project Benefits Timeline Description

Phase 2A is scheduled to be completed in 2013. As noted above, the present value benefits of the SMP are calculated through 2049 (the end of the 30-year useful life of the last desalter brought online). Although the SMP likely has a useful life of more than 50 years and will continue to provide benefits past 2049 (assuming the desalters are maintained/rebuilt after their 30-year project life), for this analysis, the useful life of the SMP is assumed to match the useful life of the SMP desalters (without which the SMP will not provide benefits).

Potential Adverse Effects from the Project

Pursuant to the requirements of the California Environmental Quality Act, Calleguas has prepared a draft Initial Study (IS) for the project. Based on findings from the IS, it was determined that Phase 2A of the SMP will result in no significant adverse environmental effects. A Negative Declaration was subsequently

prepared and certified by Calleguas as the lead agency.

Summary of Findings

The project will provide a range of both water quality and other benefits. Reduced use of SWP water will avoid the import of 13,842 MT of salts over the life of the project. The project will also enable the export of more than 96,558 MT of salts from the Watershed. In addition, reduced use of SWP water will prevent the net generation of 49,885 MT of CO_2 over the project life.

Additional qualitative benefits from the project are summarized in Table 8. Identified qualitative benefits include salt removal and avoided introduction of salts into the Watershed, improved groundwater quality, reduced CO_2 emissions, reduced stress on the Bay-Delta due to reduced SWP demands, improved water quality and ecological value in Mugu Lagoon, increased ecological and recreational benefits at the Ventura County Game Preserve (Duck Club), and potential benefits to agricultural users connected to the SMP. Each benefit is expected to increase the overall net monetized benefits of the project, if they could be monetized.

Table 8: Qualitative Benefits Summary – Water Quality and Other Benefits

Benefit	Qualitative Indicator*
Salt Removal and Avoided Introduction of Salts into the Watershed	++
Improved Groundwater Quality	++
Reduced CO_2 Emissions	++
Reduced Stress on the Bay-Delta	+
Improved Water Quality and Ecological Value in Mugu Lagoon	+
Increased Ecological Value at Ventura County Game Preserve	+
Increased Recreation Value at Ventura County Game Preserve	+
Agricultural Benefits	+

Notes:

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

This analysis of costs and benefits is based on available data and some assumptions. As a result, there may be some omissions, uncertainties, and possible biases. In most cases, omissions lead to a downward bias in benefits: the SMP is expected to be much more beneficial than the subset of benefits that can be monetized indicates. These issues are listed in Table 9.

Table 9: Omissions, Biases, and Uncertainties and Their Effect on the Project

Benefit or Cost Category	Likely Impact on Net Benefits*	Comment
Reduced CO_2 Emissions and Avoided Introduction of Salts into the Watershed	–	Analysis of benefits assumes that all of the SMP desalters will offset the use of imported SWP water because in most communities imported water is the marginal water source. If the desalters offset local groundwater, CO_2 emissions reductions would be lower.
Reduced CO_2 Emissions	U	Real reductions in carbon emissions are anticipated by avoiding SWP imports. However, the carbon intensity of the electricity sources used to move SWP water could change over time.
Agricultural Benefits	U	The use of concentrate and tertiary-treated effluent for agricultural irrigation is only a potential benefit. At this point in time, no agreements have been made with agricultural users.

Notes:

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

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Table 16 - Water Quality and Other Expected Benefits (All benefits should be in 2009 dollars) Project: Calleguas Regional Salinity Management Pipeline, Phase 2A									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value (1)	Annual $ Value (f) x (g) (1)	Discount Factor (1)	Discounted Benefits (h) x (i) (1)
2009	a								
2013	Salt removal and avoided introduction of salts into the basin	Metric Tons (MT) of salt	0	2741.55	2,742				
	Reduced CO2 Emissions	MT of CO2	0	1,233	1,233				
2014	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2741.55	2,742				
	Reduced CO2 Emissions	MT of CO_2	0	1,233	1,233				
2015	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3102.08	3,102				
	Reduced CO2 Emissions	MT of CO_2	0	1,489	1,489				
2016	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3247.19	3,247				
	Reduced CO2 Emissions	MT of CO_2	0	1578.38	1,578				
2017	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3310.2	3,310				
	Reduced CO2 Emissions	MT of CO_2	0	1613.05	1,613				
2018	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3310.2	3,310				
	Reduced CO2 Emissions	MT of CO_2	0	1613.05	1,613				
2019	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3310.2	3,310				
	Reduced CO2 Emissions	MT of CO_2	0	1613.05	1,613				
2020	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2960.16	2,960				
	Reduced CO2 Emissions	MT of CO_2	0	1405.42	1,405				
2021	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2960.16	2,960				
	Reduced CO2 Emissions	MT of CO_2	0	1405.42	1,405				
2022	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2960.16	2,960				
	Reduced CO2 Emissions	MT of CO_2	0	1405.42	1,405				
2023	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2960.16	2,960				
	Reduced CO2 Emissions	MT of CO_2	0	1,405	1,405				
2024	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2960.16	2,960				
	Reduced CO2 Emissions	MT of CO_2	0	1,405	1,405				

Table 16 - Water Quality and Other Expected Benefits (All benefits should be in 2009 dollars) Project: Calleguas Regional Salinity Management Pipeline, Phase 2A									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value (1)	Annual $ Value (f) x (g) (1)	Discount Factor (1)	Discounted Benefits (h) x (i) (1)
2025	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2960.16	2,960				
	Reduced CO2 Emissions	MT of CO_2	0	1,405	1,405				
2026	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2960.16	2,960				
	Reduced CO2 Emissions	MT of CO_2	0	1,405	1,405				
2027	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2960.16	2,960				
	Reduced CO2 Emissions	MT of CO_2	0	1,405	1,405				
2028	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2960.16	2,960				
	Reduced CO2 Emissions	MT of CO_2	0	1,405	1,405				
2029	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2960.16	2,960				
	Reduced CO2 Emissions	MT of CO_2	0	1,405	1,405				
2030	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2960.16	2,960				
	Reduced CO2 Emissions	MT of CO_2	0	1,405	1,405				
2031	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2960.16	2,960				
	Reduced CO2 Emissions	MT of CO_2	0	1,405	1,405				
2032	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2960.16	2,960				
	Reduced CO2 Emissions	MT of CO_2	0	1,405	1,405				
2033	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2960.16	2,960				
	Reduced CO2 Emissions	MT of CO_2	0	1,405	1,405				
2034	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2960.16	2,960				
	Reduced CO2 Emissions	MT of CO_2	0	1,405	1,405				
2035	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2960.16	2,960				
	Reduced CO2 Emissions	MT of CO_2	0	1,405	1,405				
2036	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2960.16	2,960				
	Reduced CO2 Emissions	MT of CO_2	0	1,405	1,405				
2037	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2960.16	2,960				
	Reduced CO2 Emissions	MT of CO_2	0	1,405	1,405				
2038	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2960.16	2,960				
	Reduced CO2 Emissions	MT of CO_2	0	1,405	1,405				
2039	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2960.16	2,960				
	Reduced CO2 Emissions	MT of CO_2	0	1,405	1,405				

Table 16 - Water Quality and Other Expected Benefits

(All benefits should be in 2009 dollars)

Project: Calleguas Regional Salinity Management Pipeline, Phase 2A

(a) Year	(b) Type of Benefit	(c) Measure of Benefit (Units)	(d) Without Project	(e) With Project	(f) Change Resulting from Project (e) – (d)	(g) Unit $ Value (1)	(h) Annual $ Value (f) x (g) (1)	(i) Discount Factor (1)	(j) Discounted Benefits (h) x (i) (1)
2040	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2960.16	2,960				
	Reduced CO2 Emissions	MT of CO_2	0	1,405	1,405				
2041	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2960.16	2,960				
	Reduced CO2 Emissions	MT of CO_2	0	1,405	1,405				
2042	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2960.16	2,960				
	Reduced CO2 Emissions	MT of CO_2	0	1405.42	1,405				
2043	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2909.45	2,909				
	Reduced CO2 Emissions	MT of CO_2	0	1394.8	1,395				
2044	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2909.45	2,909				
	Reduced CO2 Emissions	MT of CO_2	0	1394.8	1,395				
2045	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3231.23	3,231				
	Reduced CO2 Emissions	MT of CO_2	0	1280.88	1,281				
2046	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3052.71	3,053				
	Reduced CO2 Emissions	MT of CO_2	0	996.841	997				
2047	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2816.86	2,817				
	Reduced CO2 Emissions	MT of CO_2	0	706.986	707				
2048	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2816.86	2,817				
	Reduced CO2 Emissions	MT of CO_2	0	706.986	707				
2049	Salt removal and avoided introduction of salts into the basin	MT of salt	0	2816.86	2,817				
	Reduced CO2 Emissions	MT of CO_2	0	706.986	707				
Project Life	Salt removal and avoided introduction of salts into the basin	MT of salt	0	110,400	110,400				
Project Life	Reduced CO2 Emissions	MT of CO_2	0	49,885	49,885				
								Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table) Transfer to Table 20, column (f), Exhibit F: Proposal Costs and Benefits Summaries	

Comments: Each benefit shown in the share of that benefit apportioned to the SMP based on the ratio of cost of the SMP to the overall cost of the SMP plus the desalters on which it depends to have concentrate to transport. That share is 2.7% of the total costs.

(1) Complete these columns if dollar value is being claimed for the benefit.

Camrosa Round Mountain Desalter (C-13)

Summary

The Camrosa Round Mountain Desalter is a 1.0 million gallon per day (mgd) brackish groundwater desalting facility being constructed by the Camrosa Water District (Camrosa). Construction of the Round Mountain Desalter will allow Camrosa to develop local brackish groundwater resources for potable use, thereby reducing Camrosa's demand for water imported from the Bay-Delta region through the State Water Project (SWP).

The Round Mountain Desalter will be supplied by a well under a 30-year renewable lease from California State University Channel Islands (CSUCI). The high-quality potable water produced by the desalter will provide a secondary source of water to the CSUCI campus. Surplus water not used by CSUCI will be delivered to other customers within Camrosa's service area.

The concentrate stream produced by the desalting process will be disposed of through the Calleguas Municipal Water District's (Calleguas) Regional Salinity Management Pipeline (SMP). The SMP is a cornerstone project integral to the planned construction of a series of brackish groundwater desalting facilities (including the Round Mountain Desalter); it is also necessary for overall salts management in the Calleguas Creek Watershed (Watershed) to comply with a Total Maximum Daily Loads (TMDL) for salts (chloride, sulfate, boron and total dissolved solids (TDS)).

A summary of the benefits and costs of the Round Mountain Desalter is provided in Table 10. Water quality benefits are discussed in more detail in the remainder of this attachment.

Table 10: Benefit-Cost Analysis Overview

	Present Value
Costs – Total Capital and O&M	$10,973,305
Monetizable Benefits	
Water Supply Benefits	
Avoided Imported Water Costs	$16,452,894
Avoided Water Supply Pipeline Costs	$4,864,022
Total Monetizable Benefits	$21,316,916
Qualitative Benefit or Cost	**Qualitative Indicator***
Water Supply Benefits	
Increased Water Supply Reliability for Camrosa Customers	+
Improved Operational Flexibility for Calleguas and Metropolitan	+
Water Quality and Other Benefits	
Salt Removal and Avoided Introduction of Salts into the Watershed	++
Improved Groundwater Quality	+
Reduced Carbon Dioxide Emissions	+
Reduced Stress on the Bay-Delta	+
Improved Water Quality and Ecological Value in Mugu Lagoon	+

Notes:

O&M = operations and maintenance.

* Direction and magnitude of effect on net benefits:

- \+ = Likely to increase net benefits relative to quantified estimates.
- ++ = Likely to increase net benefits significantly.
- – = Likely to decrease benefits.
- – – = Likely to decrease net benefits significantly.
- U = Uncertain, could be + or –.

The "Without Project" Baseline

The Round Mountain Desalter will be located near the CSUCI campus in the Calleguas Creek Watershed. Calleguas Creek and its major tributaries, Revolon Slough, Conejo Creek, Arroyo Conejo, Arroyo Santa Rosa, and Arroyo Simi, drain an area of 343 square miles in southern Ventura County and a small portion of western Los Angeles County. Major water bodies downstream of the project include Calleguas Creek and Mugu Lagoon, which is located at the mouth of the Watershed.

Land uses in the Watershed include urban development in the cities of Simi Valley, Moorpark, Thousand Oaks, and Camarillo, with additional residential development along some of the Watershed's slopes. Agricultural cultivation of orchards and row crops occurs along valleys and on the Oxnard Plain near the coast. Other beneficial uses identified upstream of the estuary include wildlife habitat, contact and noncontact water recreation, industrial service and process supply, preservation of rare and endangered species, groundwater recharge, wetlands habitat, freshwater replenishment, and warm-water habitat. Beneficial uses identified in the estuary include wildlife habitat, contact and noncontact recreation, estuarine habitat, marine habitat, preservation of rare and endangered species, navigation, preservation of biological habitats, wetland habitat, migratory and spawning habitat, and shellfish harvesting (RWQCB, 2010).

Most of the soils, surface water, and groundwater in the Watershed contain high levels of salts, including TDS, boron, sulfate, and chloride. Primary sources of salts in surface water and groundwater include imported surface water (i.e., SWP supplies), fertilizer used in agricultural activities, and discharges from wastewater plants. Salts continue to accumulate and, currently, the mass of salts and minerals coming into the region is greater than the mass of salts and minerals leaving the region.

The accumulation of salts due to historical and ongoing point and nonpoint source pollution poses a number of problems for beneficial uses within the Watershed, including municipal, industrial, and agricultural water supply and habitat. Currently, most groundwater users must blend imported water with the groundwater in order to lower salt concentrations to meet drinking water standards. Increased quantities of water imported through the SWP place additional burden on the already-stressed Bay-Delta region. Rising salinity is also harmful to agriculture, primarily for growers of high-value crops such as strawberries and avocados who are increasingly unable to use local surface water or groundwater for irrigation without reducing agricultural productivity. High salinity levels in soils and surface water can also be detrimental to sensitive habitat and can have damaging effects on ecosystems in the Watershed.

As a result of these factors, several TMDLs have been established for the Calleguas Creek, including for salts (boron, chloride, sulfate, and TDS), nutrients, metals, toxics, and toxicity. Calleguas Creek is currently 303d listed for salts, toxicity, sediment toxicity, organophosphate pesticides, chlorpyrifos, copper, nickel, mercury, zinc, and selenium (see http://www.calleguascreek.org/ccwmp/4.asp).

Without the Round Mountain Desalter and the SMP, underutilized groundwater supplies will remain unused and dependence on imported water supply will increase, negatively affecting the Bay-Delta ecosystem. Salts will continue to concentrate in the Watershed and TMDLs will be more difficult, if not impossible, to achieve. The use of SWP water will also continue to import additional salts into the Watershed.

Water Quality and Other Benefits

The project will provide a range of water quality and other benefits. This section provides a discussion and details on benefit estimation for benefits including removal of salts from the Watershed and avoided introduction of additional salts into the Watershed, improved groundwater quality, reduced CO_2 emissions, reduced stress on the Bay-Delta, and other ecological benefits.

As described in Attachment 7, the benefits described here are partially attributable to the Round Mountain Desalter and other desalters and partially attributable to the SMP. This is

because neither project can exist and provide benefits without the other. However, because the benefits described below are mostly qualitative in nature, they are not specifically allocated (in terms of percentage of benefits) across the SMP-related projects.

Salt Removal and Avoided Introduction of Salts into the Watershed

The project will remove close to 3,009 metric tons (MT) of salt from the Watershed each year (or 90,270 MT over the 30-year project life). In addition, the Round Mountain Desalter will allow the Watershed to avoid the accumulation of 345 MT of salt per year (10,350 MT over 30 years) by offsetting the import of 1,120 acre-feet per year (AFY) of SWP water. The removal and avoided introduction of salts into the Watershed will reduce salt loading into Calleguas Creek and improve water quality for beneficial uses.

Together, the export of salts from the Watershed via the Round Mountain Desalter, and the avoided introduction of salts into the Watershed due to reduced reliance on SWP water, will reduce the amount of salts in the basin by 100,620 MT over the life of the project.

The removal of 3,009 MT of salt per year is based on the assumption that the Round Mountain Desalter will produce 0.43 million gallons of concentrate per day (435 AFY assuming 330 days of operation), and that the concentrate will have a salt concentration of 5,067 milligrams per liter (mg/L), or 6.25 MT of salt per acre-foot. To calculate the avoided import of salts due to reduced imports of SWP water, it is assumed that the average TDS concentration in SWP water is 250 mg/L (Metropolitan, 2005). Therefore, each acre-foot of SWP water contains, on average, 0.308 MT of salts.

Improved Groundwater Quality

The management of the perched aquifer through a combination of extraction, treatment at the Round Mountain Desalter, and natural replenishment will result in improvements to the existing groundwater aquifer. Regular well sampling performed by Camrosa from August through September 2010 indicates that TDS levels in the groundwater remain high, at roughly 1,800 mg/L. Restoring pumping of the groundwater in this area will make additional groundwater storage available and allow the aquifer to be replenished with higher-quality water (i.e., local runoff). The Round Mountain Desalter will thereby improve the quality of the Watershed's groundwater in the area of the perched aquifer over the long term.

Reduced CO_2 Emissions

By offsetting demands for imported water with locally produced water, the project will avoid emissions of CO_2 [carbon dioxide, a greenhouse gas (GHG)] generated by the production of energy required to transport SWP water to Ventura County. Calleguas prepared an analysis in 2007 that estimates the CO_2 emissions associated with delivery of imported water to Ventura County as well as CO_2 emissions with brackish groundwater desalting. Calleguas estimates that the CO_2 emissions rate for all electricity sources providing electricity to the SWP is 0.443 tons of CO_2/MWh (Calleguas, 2007).

Based on information from the pumping plants utilized in moving water to Ventura County, Calleguas also estimates that the electricity required for the conveyance of 1 acre-foot of imported SWP water is 4.053 MWh (Calleguas, 2007). When energy requirements at the Jensen Filtration Plant are taken into account, the total amount of energy required for every acre-foot of water delivered to Ventura County amounts to 4.090 MWh.

Given the calculated weighted average of CO_2 emissions of 0.443 tons of CO_2 emitted per MWh, 1.81 tons of CO_2 are produced for every acre-foot of water delivered to the Calleguas service area. By eliminating use of 33,600 acre-feet (AF) of imported SWP water over the assumed project life (1,120 AFY), the project will avoid emissions of more than 60,820 MT of CO_2.

Avoided carbon emissions will be offset to some extent by the energy required to pump and treat local groundwater. Power requirements for a low-pressure membrane, reverse osmosis (RO) groundwater pumping and treatment facility are on the order of 1.64 MWh/acre-foot, including pump, motor and

transmission losses (Calleguas, 2007 from AWWA, 1999). Based on the methodology described above, Calleguas estimates CO_2 production associated with RO treatment to be 0.70 tons/acre-foot of water produced. Thus, producing 33,600 AF of water at the Round Mountain Desalter will result in the emissions of about 23,520 MT of CO_2. The net reduction of CO_2 due to avoided use of SWP water therefore amounts to 37,290 MT over the life of the project (close to 1,250 MT per year).

Reduced Stress on the Bay-Delta

By reducing the use of imported SWP water, this project will augment in stream flows in the Bay-Delta or will offset other diversions that may otherwise reduce flows. Reduced demands on Delta supplies will also help reduce the overall salinity of the Delta and improve Delta habitat.

Maintaining the Delta's environmental condition is vital to maintaining and improving the viability of the region. The Delta provides drinking water to 25 million people, supports irrigation of 4.5 million acres of agricultural land, and serves as home to 750 plant and animal species. The Delta's 1,600 square miles of marshes, islands, and sloughs support at least half of the migratory water birds on the Pacific Flyway, 80 percent of California's commercial fisheries, and recreational uses including boating, fishing, and windsurfing.

Delta resources are in a state of crisis. Fish populations, including salmon and Delta-smelt, have declined dramatically in recent years. The levee system is aging, and vulnerability of the Delta to flooding, sea level rise, or a major earthquake has raised concerns about possible levee collapse. Local efforts to develop water resources that offset imported water demands, such as with the recycled water projects and the Round Mountain Desalter, will cumulatively contribute to reducing stresses on the Bay-Delta.

Improved Water Quality and Ecological Value in Mugu Lagoon

Mugu Lagoon is located at the terminus of Calleguas Creek. The lagoon is designated an Area of Special Biological Significance and is one of the few remaining significant saltwater wetlands habitats in Southern California (WMI, 2004). Mugu Lagoon is also an important habitat along the Pacific Flyway, a bird migration route running from Alaska south to Mexico. The wetlands are a critical resting area for migratory birds.

Mugu Lagoon faces numerous water quality problems stemming from land use practices, pollutant sources, and sedimentation (WMI, 2004). As discussed above, the Round Mountain Desalter will remove salts from groundwater and surface water, such that the flows in Calleguas Creek are less saline. This will help to improve and support ecological functions in Mugu Lagoon because Calleguas Creek is a primary source of freshwater to Mugu Lagoon.

Distribution of Project Benefits and Identification of Beneficiaries

Construction of the Round Mountain Desalter includes the full range of types of beneficiaries, as is summarized in Table 11. At the local level, Camrosa and its customers will benefit from improved water quality due to (1) the removal of salts from the Watershed via the SMP, (2) reduced imports of salts found in SWP water, and (3) improved groundwater and recycled water quality. Regional and statewide ecological benefits and air quality benefits include ecological improvements at the Mugu Lagoon and the Bay-Delta, and reduced GHG emissions due to reduced imports of SWP water.

Table 11: Project Beneficiaries Summary

Local	Regional	Statewide
Camrosa Water District	Mugu Lagoon	San Francisco Bay-Delta

Project Benefits Timeline Description

The Round Mountain Desalter is expected to come online in 2013. For this analysis, a 30-year useful project life is assumed for the project. Thus, benefits are calculated through 2042.

Potential Adverse Effects from the Project

Pursuant to the requirements of the California Environmental Quality Act, Camrosa prepared a draft Initial Study (IS). Based on findings from the IS, it was determined that the Round Mountain Desalter will result in no significant adverse environmental effects. A Negative Declaration was subsequently prepared and circulated for review and comment by the public and by Responsible and Trustee agencies. The Negative Declaration was certified and adopted by Camrosa's Board of Directors in April 2010.

Summary of Findings

The project will provide a range of both water quality and other benefits. Reduced use of SWP water will avoid the import of 10,350 MT of salts over the 30-year life of the project. Through interconnection with the SMP, the project will also enable the export of about 3,000 MT of salts from the Watershed each year. In addition, reduced use of SWP water will prevent the generation of 37,300 MT of CO_2 over the life of the project.

Additional qualitative benefits from the project are summarized in Table 12. Identified qualitative benefits include improved groundwater quality, reduced salts from SWP imported water, reduced stress on the Bay-Delta due to reduced SWP demands, and improved water quality and ecological benefits in Mugu Lagoon. Each benefit is expected to increase the overall net monetized benefits of the project, if they could be monetized.

Table 12: Qualitative Benefits Summary – Water Quality and Other Benefits

Benefit	Qualitative Indicator*
Salt Removal and Avoided Introduction of Salts into the Watershed	++
Improved Groundwater Quality	++
Reduced CO_2 Emissions	++
Reduced Stress on the Bay-Delta	+
Improved Water Quality and Ecological Value in Mugu Lagoon	+

Notes:

* Direction and magnitude of effect on net benefits:

- \+ = Likely to increase net benefits relative to quantified estimates.
- ++ = Likely to increase net benefits significantly.
- – = Likely to decrease benefits.
- – – = Likely to decrease net benefits significantly.
- U = Uncertain, could be + or –.

This analysis of costs and benefits is based on available data and some assumptions. As a result, there may be some omissions, uncertainties, and possible biases. These issues are listed in Table 13.

Table 13: Omissions, Biases, and Uncertainties and Their Effect on the Project

Benefit or Cost Category	Likely Impact on Net Benefits*	Comment
Reduced CO_2 Emissions	U	Real reductions in carbon emissions are anticipated by avoiding SWP imports. However, the carbon intensity of the electricity sources used to move SWP water could change over time.

Notes:

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

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Table 16 - Water Quality and Other Expected Benefits

(All benefits should be in 2009 dollars)

Project: Camrosa Round Mountain Desalter

(a) Year	(b) Type of Benefit	(c) Measure of Benefit (Units)	(d) Without Project	(e) With Project	(f) Change Resulting from Project (e) – (d)	(g) Unit $ Value (1)	(h) Annual $ Value (f) x (g) (1)	(i) Discount Factor (1)	(j) Discounted Benefits (h) x (i) (1)
2009									
2010									
2011									
2012									
2013	Salt removal and avoided introduction of salts into the basin	Metric Tons (MT) of salt	0	3,354	3,354				
	Reduced CO2 Emissions	Metric Tons (MT) of CO_2	0	1,243	1,243				
2014	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2015	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2016	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2017	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2018	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2019	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2020	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2021	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2022	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2023	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2024	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2025	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2026	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2027	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2028	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2029	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2030	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				

Table 16 - Water Quality and Other Expected Benefits

(All benefits should be in 2009 dollars)

Project: Camrosa Round Mountain Desalter

(a) Year	(b) Type of Benefit	(c) Measure of Benefit (Units)	(d) Without Project	(e) With Project	(f) Change Resulting from Project (e) – (d)	(g) Unit $ Value (1)	(h) Annual $ Value (f) x (g) (1)	(i) Discount Factor (1)	(j) Discounted Benefits (h) x (i) (1)
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2031	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2032	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2033	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2034	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2035	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2036	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2037	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2038	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2039	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2040	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2041	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
2042	Salt removal and avoided introduction of salts into the basin	MT of salt	0	3,354	3,354				
	Reduced CO2 Emissions	MT of CO_2	0	1,243	1,243				
Project Life	Salt removal and avoided introduction of salts into the basin	MT of salt		100,620	100,620				
Project Life	Reduced CO2 Emissions	MT of CO2		37,290	37,290				
								Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table) Transfer to Table 20, column (f), Exhibit F: Proposal Costs and Benefits Summaries	

Comments: The salt removal, avoided salt introduction, and reduced CO2 emissions benefits are not allocated across the Round Mountain Desalter and the SMP, as done with the water supply benefits from the joint product of the SMP and associated desalters (see Attachment 7). The benefits shown above reflect benefits associated with production at the Round Mountain Desalter only.

CamSan/Camrosa Recycled Water Interconnection (C-15)

Summary

The Camarillo Sanitary District (CamSan) is planning to construct the CamSan/Camrosa Recycled Water Interconnection (RW Interconnection). CamSan provides wastewater collection and treatment for portions of the City of Camarillo. Water service (both recycled and potable) within the City of Camarillo (City) is provided by a number of different entities, including the City and Camrosa Water District (Camrosa). The RW Interconnection is a 24-inch-diameter pipeline that will deliver tertiary-treated wastewater effluent (i.e., recycled water) from CamSan's wastewater treatment plant (WWTP) to Camrosa's storage ponds and customers, as well as to City of Camarillo customers. The RW Interconnection is needed to comply with Total Maximum Daily Loads (TMDL) for salts in the Calleguas Creek Watershed (Watershed) and develop local water supplies to improve the region's water supply reliability.

CamSan currently delivers 1.3 million gallons per day (mgd) of recycled water from its WWTP to customers within its service area. At current WWTP capacity (3.8 mgd), the RW Interconnection will enable the delivery of an additional 2.5 mgd of recycled water to agricultural and landscape irrigation customers within Camrosa and the City of Camarillo service areas. These customers currently use a mix of groundwater and imported water to irrigate their lands.

As wastewater influent to the WWTP increases over time due to population growth, the amount of recycled water produced at the WWTP and conveyed through the RW Interconnection will also increase. By 2030, when the WWTP reaches maximum capacity of 6.75 mgd, the RW Interconnection will be used to deliver a total of 5.45 mgd of recycled water to City of Camarillo and Camrosa customers. The City of Camarillo will use up to 2.9 mgd [3,240 acre-feet per year (AFY)] of recycled water delivered via the RW Interconnection. Recycled water in excess of that amount will be made available to Camrosa.

It is estimated that during approximately 30 days during the wet winter months, agricultural and landscape irrigation customers will have no demand for CamSan's supply of recycled water for irrigation. When this occurs, recycled water from the WWTP will be discharged through the RW Interconnection to Calleguas Municipal Water District's (Calleguas) Salinity Management Pipeline (SMP). Winter discharges to the SMP will also include the 1.3 mgd of effluent that is currently provided to existing recycled water customers, when it cannot be used for irrigation purposes. Connection to the SMP will allow CamSan to avoid discharging this effluent into Conejo Creek and will assist in transporting accumulated salts out of the Watershed. Excess recycled water discharged to the SMP will be available for use downstream for agricultural irrigation, if there is demand for it, or will be discharged through the Hueneme Outfall.[1]

A summary of all benefits and costs of the project is provided in Table 14. Water quality benefits are discussed in the remainder of this attachment.

[1]. To simplify the analysis, the benefits of this project are not included in the overall allocation of benefits among the SMP and the desalters on which the SMP depends. Although the RW Interconnection will discharge to the SMP for approximately 30 days per year, the amount of recycled water to be discharged with the RW Interconnection is small compared to the total discharges from the desalters and other anticipated dischargers.

Table 14: Benefit-Cost Analysis Overview

	Present Value
Costs – Total Capital and O&M	$4,346,119
Monetizable Benefits	
Water Supply Benefits	
Avoided Imported Water Supply Costs for the City of Camarillo	$18,220,720
Avoided Local Surface Water Costs	$6,549,615
Avoided Groundwater Pumping Costs	$2,729,496
Water Quality and Other Benefits	
Avoided Wastewater Treatment Costs	$15,322,941
Total Monetizable Benefits	$42,822,772
Qualitative Benefit or Cost	**Qualitative Indicator***
Water Supply Benefits	
Increased Water Supply Reliability for Camarillo Customers	+
Improved Operational Flexibility for Calleguas and Metropolitan	+
Reduced Groundwater Usage on the Oxnard Plain	+
Water Quality Benefits	
Avoided Introduction of Additional Salts into the Watershed	++
Reduced Carbon Dioxide Emissions	++
Reduced Stress on the Bay-Delta	+
Improved Water Quality and Ecological Value in Mugu Lagoon	+
Agricultural Benefits	+

Notes:

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

The "Without Project" Baseline

The RW Interconnection will be located in the Calleguas Creek Watershed. Calleguas Creek and its major tributaries, Revolon Slough, Conejo Creek, Arroyo Conejo, Arroyo Santa Rosa, and Arroyo Simi, drain an area of 343 square miles in southern Ventura County and a small portion of western Los Angeles County. Major water bodies downstream of the project include Calleguas Creek and Mugu Lagoon, which is located at the mouth of the Watershed.

Land uses in the Watershed include urban development in the cities of Simi Valley, Moorpark, Thousand Oaks, and Camarillo, with additional residential development along some of the Watershed's slopes. Agricultural cultivation of orchards and row crops occurs along valleys and on the Oxnard Plain near the coast. Other beneficial uses identified upstream of the estuary include wildlife habitat, contact and noncontact water recreation, industrial service and process supply, preservation of rare and endangered species, groundwater recharge, wetlands habitat, freshwater replenishment, and warm-water habitat. Beneficial uses identified in the estuary include wildlife habitat, contact and noncontact recreation, estuarine habitat, marine habitat, preservation of rare and endangered species, navigation, preservation of biological habitats, wetland habitat, migratory and spawning habitat, and shellfish harvesting (RWQCB, 2010).

Most of the soils, surface water, and groundwater in the Watershed contain high levels of salts, including total dissolved solids

(TDS), boron, sulfate, and chloride. Primary sources of salts in surface water and groundwater include imported surface water [i.e., State Water Project (SWP) supplies], fertilizer used in agricultural activities, and discharges from WWTPs. Salts continue to accumulate and, currently, the mass of salts and minerals coming into the region is greater than the mass of salts and minerals leaving the region.

The accumulation of salts due to historic and ongoing point and nonpoint source pollution poses a number of problems for beneficial uses within the Watershed, including municipal, industrial, and agricultural water supply and habitat. Currently, most groundwater users must blend imported water with the groundwater in order to lower salt concentrations to meet drinking water standards. Rising salinity is also harmful to agriculture, primarily for growers of high-value crops such as strawberries and avocados, who are increasingly unable to use local surface water or groundwater for irrigation without reducing agricultural productivity. High salinity levels in soils and surface water can also be detrimental to sensitive habitat and can have detrimental effects on ecosystems in the Watershed.

As a result of these factors, TMDLs have been established for the Watershed. These include salts (boron, chloride, sulfate, and TDS), nutrients, metals, toxics for pesticides and polychlorinated biphenyls, and toxicity. Calleguas Creek is currently 303d listed for salts, toxicity, sediment toxicity, organophosphate pesticides, chlorpyrifos, copper, nickel, mercury, zinc, and selenium (RWQCB, 2010).

Currently, the CamSan WWTP discharges 2.5 mgd of wastewater effluent into Conejo Creek. As population continues to increase, the amount of wastewater effluent produced at the plant will also increase; the WWTP is expected to reach full capacity in 2030, producing 6.75 mgd of treated wastewater effluent. Due to requirements associated with the established TMDLs, CamSan will not be able to continue discharging wastewater into the Creek unless it is highly treated using advanced treatment technologies [i.e., microfiltration/reverse osmosis (MF/RO)]. By providing for an alternative to discharge through the use of recycled water, the project will avoid implementation of an MF/RO facility. The MF/RO facility would need to be in place by 2023 in order to meet established TMDL requirements and would be built to treat the 5.4 mgd of water (6,100 AFY) that would otherwise be made available for recycled water use, or discharge to the SMP, via the RW Interconnection.

Without the RW Interconnection, dependence on both imported water and groundwater supply will increase, negatively affecting the Bay-Delta ecosystem. Salts will continue to concentrate in the Watershed and TMDLs will be more difficult, if not impossible, to achieve. The use of SWP water will also continue to import additional salts into the Watershed. In addition, without the project, the Pleasant Valley County Water District (PVCWD) will have less surface water available for use in lieu of groundwater in the Oxnard Plain to counteract the effects of groundwater overdraft and seawater intrusion.

Water Quality and Other Benefits

The RW Interconnection will provide a range of water quality and other benefits. This section provides a discussion and details on benefit estimation for benefits including avoided wastewater treatment costs, avoided introduction of additional salts into the Watershed, reduced CO_2 emissions, reduced groundwater pumping on the Oxnard Plain, and ecological and agricultural benefits.

Avoided Wastewater Treatment Costs

Without the RW Interconnection to enable the use of recycled water, CamSan will have to discharge the wastewater effluent produced at the WWTP to Conejo and Calleguas Creeks. However, to meet water quality requirements, this WWTP effluent would need to be treated with advanced MF/RO technology prior to discharge.

The capital costs for a 5.4 mgd MF/RO facility would amount to more than $17.4 million. Capital costs were determined by linearly scaling the estimated costs of a 2.5 mgd MF/RO facility designed for desalting wastewater at another location in the Watershed. A

similar method was used to determine O&M costs for the avoided project. By scaling O&M costs for a 1.0 mgd facility, it is estimated that O&M costs for the 5.4 mgd facility would amount to about $1.1 million per year.

To determine the total present value of avoided costs, it was assumed that the MF/RO facility would be constructed in 2021 and 2022 and that operations would begin in 2023. It was also assumed that the facility would have a 30-year useful project life (through 2052). Based on these assumptions, the total present value of avoided project costs amounts to $15,322,941.

Avoided Introduction of Additional Salts into the Watershed

Reduced demand for imported water as a result of the project will allow the Watershed to avoid accumulation of 15,487 metric tons (MT) of salts over the 50-year project life. The avoided introduction of salts into the Watershed will reduce salt loading into Calleguas Creek and improve water quality for beneficial uses.

To calculate the avoided import of salts due to reduced imports of SWP water, it is assumed that the average TDS concentration in SWP water is 250 mg/L (Metropolitan, 2005). Therefore, each acre-foot (AF) of SWP water contains 0.308 MT of salts, on average[2]. By 2030, avoided imported water use will amount to more than 1,000 AFY. Thus, at full implementation, the introduction of about 313 MT of salts will be avoided each year. Over 50 years, the project will avoid the import of 50,285 AF of SWP water, and 15,487 MT of salts will not be introduced into the Watershed.

Reduced CO_2 Emissions

By offsetting imported water demands with locally produced water, the project will avoid emissions of CO_2 [a greenhouse gas (GHG)] generated by the production of energy required to transport SWP water to Ventura County. . Calleguas prepared an analysis in 2007 that estimates the CO2 emissions associated with delivery of imported water to Ventura County as well as CO2 emissions from desalting brackish groundwater. This analysis was based on an estimate that the CO_2 emissions rate for all electricity sources providing electricity to the SWP is 0.443 tons of CO_2 per MWh (Calleguas, 2007)[3]. Based on information from the pumping plants used to move water to Ventura County, Calleguas also estimates that the electricity required for the conveyance of 1 AF of imported SWP water is 4.053 MWh (Calleguas, 2007). When energy requirements at the Jensen Filtration Plant are taken into account, the total amount of energy required for every AF of water delivered to Ventura County amounts to 4.090 MWh.

Given the calculated weighted average of CO_2 emissions of 0.443 MT of CO_2 emitted per MWh, 1.81 MT of CO_2 are produced for every AF of water delivered to the Calleguas service area (4.090 MWh/AF multiplied by 0.443 MT/MWh). By eliminating use of 50,280 AF of imported SWP water over the assumed project life, the project will avoid emissions of more than 91,000 MT of CO_2.

Avoided MF/RO treatment of wastewater effluent will also result in avoided carbon emissions. Power requirements for a MF/RO treatment facility are approximately 500 kWh/AFAssuming an emission rate of 0.433 MT per MWh, it is estimated that up to 1,350 MT of CO2 emissions from wastewater treatment will be avoided per year[4]. Offsetting the treatment of 178,163 AF of effluent over the avoided life of the MF/RO facility will result in 39,472 MT of avoided CO2 emissions.

For this analysis, the use of water made available via the RW Interconnection is assumed to have the same energy requirements as the use of non-potable water made available via the Conejo Creek Diversion. Thus, the offset of non-potable local surface water by Camrosa customers will not result in net CO_2 emissions reductions.

[2] 1 AF = 1,233,482 liters; 250 mg/L = 308,370,500 mg/AF; or 0.308 MT/AF

[3] This estimate assumes that 78% of electricity utilized by SWP is generated in California, 7% in the Pacific Northwest, and 15% in the Desert Southwest. The weighted CO2 emissions rate for these various regions is 0.402, 0.336, and 0.712 MT/MWh, respectively (California Climate Action Registry, 2005).

[4] .5 MWh per AF of energy use multiplied by 0.443 MT of CO2 emissions per MWh multiplied by 6,093 AF of effluent treated per year equals 1,350 MT of CO2 emissions per year.

Avoided CO_2 emissions will be offset to some extent by the energy (and associated CO_2 emissions) used to pump and distribute recycled water from the WWTP to customers. CamSan estimates that this requires about 0.65 MWh/AF of recycled water. Assuming the same emissions rate of 0.443 MT of CO_2 emitted per MWh, CO_2 production per AF of recycled water is estimated to be about 0.29 MT. Thus, CO_2 emissions associated with recycled water use over the 50-year project life will amount to 42,670 MT. The net reduction of CO_2 due to avoided use of SWP water and avoided effluent treatment is therefore 87,816 MT.

Reduced Stress on the Bay-Delta

By reducing the use of imported SWP water, the RW Interconnection will augment in stream flows in the Bay-Delta or offset other diversions that may otherwise reduce flows. Reduced demands on Delta supplies also will help reduce the overall salinity of the Delta and improve Delta habitat.

Maintaining the Delta's environmental condition is vital to maintaining and improving the viability of the region. The Delta provides drinking water to 25 million people, supports irrigation of 4.5 million acres of agricultural land, and serves as home to 750 plant and animal species. The Delta's 1,600 square miles of marshes, islands, and sloughs support at least half of the migratory water birds on the Pacific Flyway, 80 percent of California's commercial fisheries; and recreational uses including boating, fishing, and windsurfing.

Delta resources are in a state of crisis. Fish populations, including salmon and Delta smelt, have declined dramatically in recent years. The levee system is aging, and vulnerability of the Delta to flooding, sea level rise, or a major earthquake has contributed to concerns about possible levee collapse. Local efforts to beneficially reuse recycled water and offset imported water demands, such as with the RW Interconnection, will cumulatively contribute to reducing stresses on the Bay-Delta.

Improved Water Quality and Ecological Value in Mugu Lagoon

Mugu Lagoon is located at the terminus of Calleguas Creek. The lagoon is designated an Area of Special Biological Significance and is one of the few remaining significant saltwater wetlands habitats in southern California (WMI, 2004). Mugu Lagoon is also an important habitat along the Pacific Flyway. The wetlands are a critical resting area for migratory birds.

Mugu Lagoon faces numerous water quality problems stemming from land use practices, pollutant sources, and sedimentation (WMI, 2004). As discussed above, the RW Interconnection will avoid wastewater discharges to Conejo and Calleguas Creeks, such that the flows in Calleguas Creek are less saline. This will help to improve and support ecological functions in Mugu Lagoon because Calleguas Creek is a primary source of freshwater to Mugu Lagoon.

Agricultural Benefits

Agricultural users within the Camrosa and CamSan service areas will benefit because they will receive recycled water that is lower in salts than local groundwater. Downstream agricultural users that grow turf grass (sod) or other salt tolerant crops will also benefit from the RW Interconnection because it will provide both wintertime recycled water into the SMP as well as reduce the use of Conejo Creek Diversion water by Camrosa customers. Reduced use of Conejo Creek Diversion water will allow higher quality irrigation waters to be delivered to downstream customers, such as the Pleasant Valley County Water District.

It is expected that turf grass yields may improve with a switch from local groundwater, which has an average TDS concentration of 27,000 mg/L, to recycled water from the SMP and/or Calleguas Creek waters which have a TDS concentration of approximately 1,500 mg/L to 4,000 mg/L. This water quality improvement will benefit agriculture in general as well as the specific turf farming industry in Ventura County which generated more than $53 million in crop value in 2009 (Ventura County, 2009).

Agricultural producers in the area currently pay the cost to pump groundwater, plus an

extraction fee of $4/AF to the Fox Canyon Groundwater Management Agency. Using SMP and/or Conejo Creek water will allow the turf farmers to avoid groundwater-related charges. It is not currently known what farmers will be charged for SMP and/or Conejo Creek water. The amount of water that agricultural users will demand from the SMP and/or Conejo Creek water, and the timing of those demands, is currently unknown.

Distribution of Project Benefits and Identification of Beneficiaries

The RW Interconnection includes the full range of types of beneficiaries, as summarized in Table 15. At the local level, the City of Camarillo, Camrosa, and their customers will benefit from improved water quality due to reduced imports of salts found in SWP water. In addition, agencies with WWTPs such as CamSan will benefit by avoiding recycled water discharge to Calleguas Creek which facilitates meeting the salts TMDLs. Regionally, agricultural customers receiving recycled water will benefit due to improved quality of their irrigation water. PVCWD and groundwater users in the Oxnard Plain will also benefit from reduced groundwater overdraft and seawater intrusion. Regional and statewide ecological and air quality benefits include ecological improvements and improved water quality in Mugu Lagoon and the Bay-Delta and reduced GHG emissions due to reduced imports of SWP water.

Table 15: Project Beneficiaries Summary

Local	Regional	Statewide
City of Camarillo	Downstream agricultural users of recycled water	San Francisco Bay-Delta
Camrosa Water District	Mugu Lagoon	
Camarillo Sanitary District	Pleasant Valley County Water District and Oxnard Plain groundwater pumpers	

Project Benefits Timeline Description

The RW Interconnection is expected to come online in mid-2014. Design efforts for the project should be completed by June 2012 and construction will begin in January 2013. Construction is expected to take 18 months. For this analysis, a 50-year useful project life is assumed, thus benefits and costs are calculated through 2063, 50 years after the project comes online.

Avoided water quality treatment project costs were calculated through 2052. This is because the MF/RO facility would come online in 2023 and would have a useful life of approximately 30 years. Actions that would be taken by CamSan after the useful life of the project (e.g., reconstruction of the facility, increased maintenance and repair) are unknown.

Potential Adverse Effects from the Project

Pursuant to the requirements of the California Environmental Quality Act, the Final Program Environmental Impact Report (PEIR) for the Renewable Water Resources Management Program for the Southern Reaches of the Calleguas Creek Watershed, which includes the RW Interconnection, was previously certified. Camrosa served as the lead agency for the Program EIR, and CamSan was a responsible agency. Based on findings from the PEIR, it was determined that the RW Interconnection is not expected to result in any significant adverse effects.

Summary of Findings

The project will provide a range of both water quality and other benefits. Reduced use of SWP water will avoid the import of 15,487 MT of salts over the 50-year life of the project.

Through interconnection with the SMP, the project will also export 38,920 MT of salts from the Watershed. In addition, reduced use of SWP water imports will prevent the generation of 116,130 MT of CO_2 over the 50-year project life.

Additional qualitative benefits from the project are summarized in Table 16. Identified qualitative benefits include reduced stress on the Bay-Delta due to reduced SWP demands, improved water quality, and ecological benefits in Mugu Lagoon. If they could be monetized, each benefit would be expected to increase the overall net monetized benefits of the project.

Table 16: Qualitative Benefits Summary – Water Quality and Other Benefits

Benefit	Qualitative Indicator*
Avoided Introduction of Additional Salts into the Watershed	++
Reduced CO_2 Emissions	+
Reduced Stress on the Bay-Delta	+
Improved Water Quality and Ecological Value in Mugu Lagoon	+
Agricultural Benefits	+

Notes:

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

This analysis of costs and benefits is based on available data and some assumptions. As a result, there may be some omissions, uncertainties, and possible biases. These issues are listed in Table 17.

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Table 17: Omissions, Biases, and Uncertainties, and Their Effect on the Project

Benefit or Cost Category	Likely Impact on Net Benefits*	Comment
Avoided Water Quality Treatment Project Costs	+	Avoided water quality treatment project costs were calculated through 2052. This is because the MF/RO facility would come online in 2023 and would have a useful life of approximately 30 years. The avoided costs of potential reinvestment in the MF/RO facility to match the useful life of the RW Interconnection through 2063 were not included in the analysis.
Reduced CO_2 Emissions	U	Real reductions in carbon emissions are anticipated by avoiding SWP imports. However, the carbon intensity of the electricity sources used to move SWP water could change over time.
Project Costs	U	The calculation of the present value of costs is a function of the timing of capital outlays and a number of other factors and conditions. Changes in these variables will change the estimate of costs.

Notes:

* Direction and magnitude of effect on net benefits:

+	=	Likely to increase net benefits relative to quantified estimates.
++	=	Likely to increase net benefits significantly.
–	=	Likely to decrease benefits.
– –	=	Likely to decrease net benefits significantly.
U	=	Uncertain, could be + or –.

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Table 16 - Water Quality and Other Expected Benefits
(All benefits should be in 2009 dollars)
Project: CamSan/Camrosa Recycled Water Interconnection

(a) Year	(b) Type of Benefit	(c) Measure of Benefit (Units)	(d) Without Project	(e) With Project	(f) Change Resulting from Project (e) – (d)	(g) Unit $ Value (1)	(h) Annual $ Value (f) x (g) (1)	(i) Discount Factor (1)	(j) Discounted Benefits (h) x (i) (1)
2009									
2010									
2011									
2012									
2013									
2014	Avoided introduction of salts into the basin	MT of salt	0	167	167				
	Reduced CO2 Emissions	MT of CO_2	0	520	520				
2015	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	976	976				
2016	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	976	976				
2017	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	976	976				
2018	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	976	976				
2019	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	976	976				
2020	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	976	976				
2021	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	976	976				
2022	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	976	976				
2023	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,069	2,069				
2024	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,106	2,106				
2025	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,143	2,143				
2026	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,179	2,179				
2027	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,216	2,216				
2028	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,252	2,252				
2029	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,289	2,289				
2030	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,326	2,326				
2031	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,326	2,326				
2032	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,326	2,326				

2033	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,326	2,326				
2034	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,326	2,326				
2035	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,326	2,326				
2036	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,326	2,326				
2037	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,326	2,326				
2038	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,326	2,326				
2039	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,326	2,326				
2040	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,326	2,326				
2041	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,326	2,326				
2042	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,326	2,326				
2043	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,326	2,326				
2044	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,326	2,326				
2045	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,326	2,326				
2046	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,326	2,326				
2047	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,326	2,326				
2048	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,326	2,326				
2049	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,326	2,326				
2050	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,326	2,326				
2051	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,326	2,326				
2052	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	2,326	2,326				
2053	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	976	976				
2054	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	976	976				
2055	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	976	976				
2056	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	976	976				

2057	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	976	976				
2058	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	976	976				
2059	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	976	976				
2060	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	976	976				
2061	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	976	976				
2062	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	976	976				
2063	Avoided introduction of salts into the basin	MT of salt	0	313	313				
	Reduced CO2 Emissions	MT of CO_2	0	976	976				
Project Life	Avoided introduction of salts into the basin	MT of salt		15,487	15,487				
Project Life	Reduced CO2 Emissions	MT of CO2		87,816	87,816				
								Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table) Transfer to Table 20, column (f), Exhibit F: Proposal Costs and Benefits Summaries	
Comments: The RW Interconnection avoids the import of SWP water into the region, which avoids import of salts in the SWP water, which has a TDS concentration of approximately 250 mg/l. To calculate net reduced CO2 emissions, carbon dioxide emissions associated with recycled water production locally were subtracted from carbon dioxide emissions associated with avoided SWP water imports and avoided MF/RO treatment of effluent.									

(1) Complete these columns if dollar value is being claimed for the benefit.

Table 13 - Annual Costs of Avoided Projects

(All avoided costs should be in 2009 dollars)

Project: CamSan/Camrosa Recycled Water Interconnection

	Costs				Discounting Calculations	
(a)	(b)	(c)	(d)	(e)	(f)	(g)
YEAR	Alternative (Avoided Project Name): MF/RO Wastewater Treatment Facility *Avoided Project Description: If wastewater effluent is not used as recycled water, it will be discharged to surface water. Due to TMDLs in the Calleguas Creek Watershed, the effluent will require advanced treatment through microfiltration/reverse osmosis prior to discharge.*				Discount Factor	Discounted Costs (e) x (f)
	Avoided Capital Costs	Avoided Replacement Costs	Avoided Operations and Maintenance Costs	Total Cost Avoided for Individual Alternatives (b) + (c) + (d)		
2009				$ -	1.00	$0
2010				$ -	0.943	$0
2011				$ -	0.890	$0
2012				$ -	0.840	$0
2013				$ -	0.792	$0
2014				$ -	0.747	$0
2015				$ -	0.705	$0
2016				$ -	0.665	$0
2017				$ -	0.627	$0
2018				$ -	0.592	$0
2019				$ -	0.558	$0
2020				$ -	0.527	$0
2021	$ 8,702,400			$ 8,702,400	0.497	$4,325,093
2022	$ 8,702,400			$ 8,702,400	0.469	$4,081,426
2023			$ 1,071,483	$ 1,071,483	0.442	$473,595
2024			$ 1,071,483	$ 1,071,483	0.417	$446,808
2025			$ 1,071,483	$ 1,071,483	0.394	$422,164
2026			$ 1,071,483	$ 1,071,483	0.371	$397,520
2027			$ 1,071,483	$ 1,071,483	0.350	$375,019
2028			$ 1,071,483	$ 1,071,483	0.331	$354,661
2029			$ 1,071,483	$ 1,071,483	0.312	$334,303
2030			$ 1,071,483	$ 1,071,483	0.294	$315,016
2031			$ 1,071,483	$ 1,071,483	0.278	$297,872
2032			$ 1,071,483	$ 1,071,483	0.262	$280,729
2033			$ 1,071,483	$ 1,071,483	0.247	$264,656
2034			$ 1,071,483	$ 1,071,483	0.233	$249,656
2035			$ 1,071,483	$ 1,071,483	0.220	$235,726
2036			$ 1,071,483	$ 1,071,483	0.207	$221,797
2037			$ 1,071,483	$ 1,071,483	0.196	$210,011
2038			$ 1,071,483	$ 1,071,483	0.185	$198,224
2039			$ 1,071,483	$ 1,071,483	0.174	$186,438
2040			$ 1,071,483	$ 1,071,483	0.164	$175,723
2041			$ 1,071,483	$ 1,071,483	0.155	$166,080
2042			$ 1,071,483	$ 1,071,483	0.146	$156,437
2043			$ 1,071,483	$ 1,071,483	0.138	$147,865
2044			$ 1,071,483	$ 1,071,483	0.130	$139,293
2045			$ 1,071,483	$ 1,071,483	0.123	$131,792
2046			$ 1,071,483	$ 1,071,483	0.116	$124,292
2047			$ 1,071,483	$ 1,071,483	0.109	$116,792
2048			$ 1,071,483	$ 1,071,483	0.103	$110,363
2049			$ 1,071,483	$ 1,071,483	0.097	$103,934
2050			$ 1,071,483	$ 1,071,483	0.092	$98,576
2051			$ 1,071,483	$ 1,071,483	0.087	$93,219
2052			$ 1,071,483	$ 1,071,483	0.082	$87,862
					Total Present Value of Discounted Costs (Sum of Column (g))	$15,322,941
					(%) Avoided Cost Claimed by Project	100%
					Total Present Value of Discounted Avoided Project Costs Claimed by alternative Project (Total Present Value of Discounted Costs x % Avoided Cost Claimed by Project)	$15,322,941

Comments: The MF/RO facility would need to be operational by 2023 to meet the time schedule order associated with the salts TMDL. This project will be avoided by the RW Interconnection.

UWCD Seawater Barrier Pilot Well (SC-9)

Summary

The United Water Conservation District (UWCD), in partnership with the City of Oxnard, is installing a Seawater Barrier Pilot Well in order to reduce seawater intrusion and its damaging effects on the Oxnard Plain aquifers. UWCD will pump 1,500 acre-feet of groundwater per year (AFY) from the easily recharged Oxnard Forebay, where water supplies are plentiful, and inject it through the Seawater Barrier Pilot Well into the less easily recharged aquifers of the Oxnard Plain. Water will be injected for a period of about five years to monitor the effects and benefits of this well to prevent seawater intrusion.

The operation of this pilot well is the first step in the creation of a seawater intrusion barrier on the Oxnard Plain. If results from the pilot well confirm that the wellsite is an appropriate location to slow seawater intrusion, and that the chemistry of groundwater from the shallow supply aquifer is compatible with the deep receiving aquifer, seven additional injection wells will be constructed to create the seawater barrier wellfield to complement the benefits provided by the existing pilot well.

The pilot well also is expected to raise public awareness of the benefits of groundwater injection, potentially paving the way for public acceptance of use of recycled water for injection. The recycled water will be produced by the City of Oxnard's Advanced Water Purification Facility (AWPF), where it will be treated to an advanced level using reverse osmosis technology. If it is determined that injecting high quality recycled water is feasible and acceptable to the public, water injected will be 50 percent groundwater and 50 percent recycled water. This mixture will be injected into the well for the remainder of the well's assumed 25-year lifetime and will allow the City of Oxnard to gain credits for injection of recycled water. These credits can be used to pump groundwater from the Oxnard Forebay. Recycled water injection will allow the City of Oxnard to meet its demand with groundwater rather than SWP water.

A summary of all benefits and costs of the project is provided in Table 18. Water quality and other benefits are discussed in the remainder of this attachment.

Table 18: Benefit-Cost Analysis Overview

	Present Value
Costs – Total Capital and O&M	$5,564,673
Monetizable Benefits	
Water Supply Benefits	
Avoided Imported Water Supply Costs for Agricultural Pumpers	$1,923,613
Avoided Imported Water Supply Costs for City of Oxnard	$7,643,442
Total Monetizable Benefits	$9,567,055

Qualitative Benefit or Cost	Present Value Qualitative Indicator*
Water Supply Benefits	
Increased Water Supply Reliability for Mutual Water Companies	+
Water Quality or Other Benefits	
Improved Groundwater Quality	++
Provide Data on Water Quality Compatibilities	+
Reduced CO_2 Emissions	+
Reduced Stress on Bay-Delta	+
Protection of Agricultural	++

Notes:

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

The "Without Project" Baseline

Groundwater overdraft on the Oxnard Plain has been causing seawater to intrude into aquifers since the 1950s. Today, the groundwater overdraft on the Oxnard Plain is estimated at 26,000 AF per year (UWCD, 2010). The saline intruded land area is estimated to increase by 260 acres every year, moving east along Hueneme Road and north from Naval Base Ventura County - Point Mugu. Without action to reverse the overdraft, seawater intrusion will continue. At some point (probably during the next major drought), water pumped from groundwater wells on the Oxnard Plain will have chloride concentrations too high for agricultural use; 120 milligrams per liter (mg/L) is considered an upper limit of chloride concentrations suitable for agriculture. The chloride concentration in some active lower aquifer system production wells on the Oxnard Plain has already exceeded 500 mg/L.

Although alternative water supply options will be explored, without significant efforts to reverse seawater intrusion, ultimately groundwater quality may become so poor that the Oxnard Plain would be unable to support agriculture, an extraordinary loss as this area is extremely productive farmland.

Water Quality and Other Benefits

This section describes water quality and other benefits generated by the project. These benefits include improved groundwater quality, improved data on water compatibilities, reduced CO_2 emissions, and reduced stress on the Bay-Delta.

Improved Groundwater Quality

The Seawater Barrier Pilot Well will combat seawater intrusion along the coast. This should reduce the area of yearly seawater intrusion beginning in 2012. The amount of seawater intrusion that can be prevented by the pilot well is estimated to be 15 acres per year. This rate was calculated using the ratio of water injected into the seawater barrier to the total overdraft, and multiplying the result by the current loss of acreage because of seawater intrusion [(1,500 AF not injected/26,000 AF overdraft)*260 acres seawater intrusion = 15 additional acres per year]. Prevention of seawater intrusion will help reduce the increase in chloride levels that can affect agricultural pumping and preserve agricultural uses in this area of productive farmland.

Improved Data on Water Quality Compatibilities

With the Seawater Barrier Pilot Well, data will be collected and analyzed on the compatibility of water taken from the Upper Aquifer System in the Oxnard Forebay with the water in the Lower Aquifer System on the Oxnard Plain. These data will be important for optimally injecting water into the pilot well as well as for designing other injection wells to be built.

In addition, the pilot well will provide data on the most favorable positions to place other wells that may be constructed if UWCD and the City of Oxnard proceed with the large-scale seawater intrusion barrier.

Reduced CO_2 Emissions

By offsetting imported water demands with locally produced water, the project will avoid emissions of CO_2 (a greenhouse gas) generated by the production of energy required to transport SWP water to Ventura County. Calleguas prepared an analysis in 2007 that estimates the CO_2 emissions associated with delivery of imported water to Ventura County. This analysis was based on an estimate that the CO_2 emissions rate for all electricity sources providing electricity to the SWP is 0.443 tons of CO_2 per MWh (Calleguas, 2007).

Based on information from the pumping plants used to move water to Ventura County, Calleguas also estimates that the electricity required for the conveyance of 1 AF of imported SWP water is 4.053 MWh (Calleguas, 2007). When energy requirements at the Jensen Filtration Plant are taken into account, the total amount of energy required for every AF of water delivered to Ventura County amounts to 4.090 MWh.

Given the calculated weighted average of CO_2 emissions of 0.443 MT of CO_2 emitted per MWh, 1.81 MT of CO_2 are produced for every AF of water delivered to the Calleguas service area (4.090 MWh/AF multiplied by 0.443 MT/MWh). By eliminating use of 19,313 AF of imported SWP water over the assumed life of the well, the project will avoid emissions of greater than 34,950 MT of CO_2.

Reduced Stress on the Bay-Delta

By reducing the future use of imported SWP water, as described in Attachment 7, the Seawater Barrier Pilot Well will augment in stream flows in the Bay-Delta or offset other diversions that may otherwise reduce flows. Reduced demands on Delta supplies will also help reduce the overall salinity of the Delta and improve Delta habitat.

Maintaining the Delta's environmental condition is vital to maintaining and improving the viability of the region. The Delta provides drinking water to 25 million people, supports irrigation of 4.5 million acres of agricultural land, and serves as home to 750 plant and animal species. The Delta's 1,600 square miles of marshes, islands, and sloughs support at least half of the migratory water birds on the Pacific Flyway, 80 percent of California's commercial fisheries; and recreational uses including boating, fishing, and windsurfing.

Local efforts to develop and maintain local water supplies and offset imported water demands, such as with the Seawater Barrier Well, will cumulatively contribute to reducing stresses on the Bay-Delta.

Protection of Agricultural

Groundwater of suitable quality is essential to agriculture, which is a $1.6 billion industry in Ventura County (County of Ventura, 2010). Ventura County is the 9th most agriculturally productive county in the State of California and the 10th most productive in the nation.

Agriculture on the Oxnard Plain is largely dependent on groundwater sources. If the groundwater quality is degraded such that it is no longer usable for agriculture, farming may be gradually eliminated as the seawater intrusion progresses inland. Although alternative water supply options will be explored, without significant efforts to reverse seawater intrusion, ultimately groundwater quality may become so poor that the Oxnard Plain would be unable to support agriculture, an extraordinary loss as this area is extremely productive farmland. The Seawater Barrier Pilot Well would be an important first step in protecting and improving groundwater quality, thereby preserving agricultural productivity on the Oxnard Plain.

Distribution of Project Benefits and Identification of Beneficiaries

There will be local, regional, and statewide benefits due to the Seawater Barrier Pilot Well as summarized in Table 19. Agricultural pumpers will benefit from a reduction in seawater intrusion that protects their vital groundwater supplies. The City of Oxnard and UWCD will directly benefit from the knowledge that the pilot well will provide regarding water compatibility between the lower and upper aquifers. There will be statewide benefits as reduced SWP demands from City of Oxnard and agricultural pumpers reduce stress on the San Francisco Bay-Delta, thereby benefitting Calleguas Municipal Water District and Metropolitan Water District of Southern California (the imported water purveyors) as well.

Table 19: Project Beneficiaries Summary

Local	Regional	Statewide
City of Oxnard	United Water Conservation District	San Francisco Bay-Delta
Agricultural Pumpers on Oxnard Plain	Calleguas Municipal Water District	
Agriculture Industry in Ventura County	Metropolitan Water District of Southern California	

Project Benefits Timeline Description

Construction of the Seawater Barrier Pilot Well will be completed in 2012. Water supply benefits will accrue to the City of Oxnard between 2017 to 2036 and to the agricultural pumpers between 2027 to 2036. The well's projected useful life ends in 2036, 25 years after well operation begins in 2012. The immediate benefits will occur over the first five years of well operation as data is collected and analyzed. However, the information could be used in constructing and operating injection wells for many years into the future.

Potential Adverse Effects from the Project

Under the California Environmental Quality Act (CEQA), an Environmental Impact Report (EIR) was prepared by Oxnard for the GREAT program, including the Seawater Barrier Pilot Well (SCH #2003011045). The EIR was adopted by Oxnard on 14 September 2004. The EIR did not identify any adverse effects from this project.

Summary of Findings

Reduced seawater intrusion as a result of the pilot well will improve groundwater quality especially by reducing the increase in chloride levels that can affect agricultural pumping. The pilot well will also provide information about water compatibilities that will aid operation of the pilot well and future wells. Reduced use of SWP water imports as a result of the project will prevent the generation of greater than 34,950 MT of CO_2 over the 25-year useful life of the well. Reduced SWP demands will also reduce stress on the Bay-Delta. Table 20 summarizes the qualitative assessment of these benefits. If they could be monetized, each benefit would be expected to increase the overall net monetized benefits of the project.

Table 20: Qualitative Benefits Summary – Water Quality and Other Benefits

Benefit	Qualitative Indicator
Improved Groundwater Quality	+
Provide Data on Water Quality Compatibilities	+
Reduced CO_2 Emissions	+
Reduced Stress on Bay-Delta	+
Protection of Agriculture	++

Note:

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.

This analysis of costs and benefits is based on available data and some assumptions. As a result, there may be some omissions, uncertainties, and possible biases. These issues are listed in Table 21.

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Table 21: Omissions, Biases, and Uncertainties, and Their Effect on the Project

Benefit or Cost Category	Likely Impact on Net Benefits*	Comment
Reduced CO_2 Emissions	U	Real reductions in carbon emissions are anticipated by avoiding SWP imports. However, the carbon intensity of the electricity sources used to move SWP water could change over time.

Notes:

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

References

CO_2 Emissions and Imported State Project Water to Ventura County. January 2007. Memorandum from General Manager to Board of Directors, Calleguas Municipal Water District.

Annual Investigation and Report of Groundwater Conditions Within United Water Conservation District. March 2010. United Water Conservation District.

Table 16 - Water Quality and Other Expected Benefits

(All benefits should be in 2009 dollars)

Project: UWCD Seawater Barrier Pilot Well

(a) Year	(b) Type of Benefit	(c) Measure of Benefit (Units)	(d) Without Project	(e) With Project	(f) Change Resulting from Project (e) – (d)	(g) Unit $ Value (1)	(h) Annual $ Value (f) x (g) (1)	(i) Discount Factor (1)	(j) Discounted Benefits (h) x (i) (1)
2009									
2010									
2011									
2012									
2013									
2014									
2015									
2016									
2017	Reduced CO2 emissions	metric tons	0	1,358					
2018	Reduced CO2 emissions	metric tons	0	1,358					
2019	Reduced CO2 emissions	metric tons	0	1,358					
2020	Reduced CO2 emissions	metric tons	0	1,358					
2021	Reduced CO2 emissions	metric tons	0	1,358					
2022	Reduced CO2 emissions	metric tons	0	1,358					
2023	Reduced CO2 emissions	metric tons	0	1,358					
2024	Reduced CO2 emissions	metric tons	0	1,358					
2025	Reduced CO2 emissions	metric tons	0	1,358					
2026	Reduced CO2 emissions	metric tons	0	1,358					
2027	Reduced CO2 emissions	metric tons	0	1,833					
2028	Reduced CO2 emissions	metric tons	0	1,901					
2029	Reduced CO2 emissions	metric tons	0	1,968					
2030	Reduced CO2 emissions	metric tons	0	2,036					
2031	Reduced CO2 emissions	metric tons	0	2,104					
2032	Reduced CO2 emissions	metric tons	0	2,172					
2033	Reduced CO2 emissions	metric tons	0	2,240					
2034	Reduced CO2 emissions	metric tons	0	2,308					
2035	Reduced CO2 emissions	metric tons	0	2,376					
2036	Reduced CO2 emissions	metric tons	0	2,444					
Project Life	25 years			34,956				…	

Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table) Transfer to Table 20, column (f), Exhibit F: Proposal Costs and Benefits Summaries: $0

Comments:

Ventura County Waterworks District No. 16 – Piru Treatment Plant Tertiary Upgrade (SC-10)

Summary

The Ventura County Waterworks District (VCWWD) No. 16 Piru Wastewater Treatment Plant (PWWTP) project is to upgrade the PWWTP to allow for the production of up to 560 acre-feet (AF) of recycled water per year.

Under Phase I of the PWWTP Project (completed in February 2010), VCWWD constructed a new secondary wastewater treatment facility in order to meet Regional Water Quality Control Board (RWQCB) discharge requirements. However, the effluent produced from Phase I does not meet the RWQCB's groundwater quality objectives for total dissolved solids (TDS) and chloride, nor does it comply with tertiary treatment requirements for recycled water. The PWWTP currently treats about 250 acre-feet per year (AFY) of effluent, which is discharged into off-site percolation ponds.

The Piru Treatment Plant Tertiary Upgrade (Piru Tertiary Upgrade) will provide the improvements necessary to produce recycled water from the PWWTP that will be in compliance with Title 22 of the California Code of Regulations for tertiary treatment. As a result, the PWWTP's tertiary-treated effluent (i.e., recycled water) will be made available for use by neighboring nurseries and citrus farmers. This will offset the use of groundwater and local surface water by these customers and prevent further discharge of wastewater effluent to the PWWTP percolation ponds. This phase of the upgrade will help the PWWTP to meet groundwater quality objectives in the vicinity of the off-site percolation ponds.

When the Piru Tertiary Upgrade comes online in 2014, it will produce close to 285 AFY of recycled water. At full PWWTP capacity, 0.5 million gallons per day (mgd) or 560 AFY of recycled water will be made available to agricultural customers for the irrigation of about 600 acres.

A summary of all benefits and costs of the project is provided in Table 22. Water quality and other benefits are discussed in the remainder of this attachment.

Table 22: Benefit-Cost Analysis Overview

	Present Value
Costs – Total Capital and O&M	$4,511,997
Monetizable Benefits	
Water Supply Benefits	
Avoided Water Supply Costs to Agricultural Customers	$1,405,031
Avoided Groundwater Well Construction at the PWWTP	$622,800
Water Quality and Other Benefits	
Avoided Wastewater Discharge Fines	$6,287,490
Avoided PWWTP Pipeline Upgrade Costs	$423,000
Avoided Percolation Pond O&M Costs	$161,055
Total Monetizable Benefits	$8,899,376

Qualitative Benefit or Cost	Qualitative Indicator*
Water Supply Benefits	
Increased Water Supply Reliability for Agricultural Customers and the Community of Piru	+
Water Quality Benefits	
Improved Groundwater Quality	+

Notes:

O&M = operations and maintenance.

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

The "Without Project" Baseline

The PWWTP, which provides sewage treatment for the Piru Disadvantaged Community (DAC), is located within the Santa Clara River Watershed (Watershed) in the Piru groundwater basin. The plant is operated by VCWWD No. 16.

VCWWD currently operates the PWWTP under the waste discharge requirements (WDR) for permit No. R4-2009-0027 issued by the Los Angeles RWQCB. The permit allows for the discharge of secondary-treated effluent from the PWWTP to off-site percolation ponds (located approximately 500 feet from the Santa Clara River), provided that the groundwater beneath the ponds does not exceed water quality objectives. Beneficial uses of the groundwater in the area (Piru Creek Hydrologic Area within the Ventura Central Groundwater Basin) include municipal and domestic supply, industrial service supply, industrial process supply, and agricultural supply.

As a result of Phase I of the PWWTP Project which provided secondary treatment at an expanded facility, water quality objectives have been achieved for biological oxygen demand, total suspended solids, ammonia, sulfate, nitrates, and oil and grease. However, levels of TDS and chloride in PWWTP effluent, and in the groundwater beneath the percolation ponds continue to exceed limits of 1,200 milligrams per liter (mg/L) and 100 mg/L, respectively.

The RWQCB has stated that they will begin to fine VCWWD up to $10,000 per day, beginning in April 2012, if permit requirements are not met. If the project is not implemented, VCWWD's only option for meeting permit requirements would be to treat the effluent from the PWWTP with advanced treatment technologies [i.e., microfiltration/reverse osmosis (MF/RO)] prior to discharging it to the percolation ponds. MF/RO (and associated concentrate disposal) would be prohibitively expensive for the disadvantaged community of Piru to implement.

In addition, in order to continue discharging to the percolation ponds, VCWWD would need to upgrade/resize the pipeline that is used to convey treated effluent from the PWWTP to the percolation ponds. The new pipeline would be necessary to accommodate future wastewater flows, which are expected to increase from about 285 AFY in 2012 to 560 AFY by 2029 and would convey additional wastewater further contributing to groundwater contamination.

Water Quality and Other Benefits

The project will provide a range of water quality and other benefits. This section provides discussion and details on benefit estimation including avoided wastewater discharge fines, avoided costs associated with upgrade of the PWWTP's existing effluent pipeline, avoided O&M costs of the PWWTP percolation ponds (including groundwater monitoring), and improved groundwater quality.

Avoided Wastewater Discharge Fines

Without the Piru Tertiary Upgrade, VCWWD would continue to discharge the wastewater effluent produced at the PWWTP to the existing percolation ponds, which would result in WDR violations. As noted above, the RWQCB will begin to fine Ventura County up to $10,000 per day, beginning in April 2012, if permit requirements are not met.

VCWWD's options are limited for meeting the water quality requirements without implementing the Piru Tertiary Upgrade. As discussed earlier, the only option would be to treat effluent from the PWWTP using advanced MF/RO technology prior to discharge. The total present value costs of constructing and operating a 0.5 mgd (560-AFY) MF/RO facility would amount to approximately $5,575,000 over a 35-year project life, excluding concentrate disposal costs. However, the concentrate disposal costs associated with an MF/RO facility in this area would be prohibitively expensive, with costs potentially ranging up to $19 million per year for trucking of concentrate based on a locally provided estimate. Therefore, the community of Piru would not be able to implement this alternative, and it is not included in this analysis as a viable "without project" alternative.

For this analysis, it is assumed that without the project, VCWWD will not meet the WDR and the RWQCB will assess fines for those water quality violations. Regional Water Quality Control Boards have the discretion to adjust fine amounts downward from the maximum based on an ability to pay, the conduct of the discharger, and other factors (State Water Resources Control Board, 2009). To show the magnitude of potential fines even after they have been adjusted to a relatively small percentage of the maximum, it is assumed that the RWQCB will adjust fines to 15 percent of the maximum, or $1,500 per day. This will amount to $547,500 in fines per year in 2009 dollars. At this rate, over the 35-year project life, VCWWD will incur a present value total of $6,287,490 in water quality-related fines.

Avoided PWWTP Pipeline Upgrade Costs

VCWWD currently provides sewer services to more than 400 households in the community of Piru and treats about 280 AFY of wastewater effluent at the PWWTP. Within 20 years, there are expected to be just over 700 households within the service area, and the PWWTP will reach full capacity at 560 AFY. In the absence of the Piru Tertiary Upgrade, VCWWD will continue to discharge secondary treated effluent to the PWWTP percolation ponds. To accommodate increased future wastewater flows, VCWWD will need to rebuild the 5,000-foot-long pipeline that conveys treated effluent from the PWWTP to the percolation ponds. The diameter of the pipeline will need to be increased from 6 inches to 12 inches.

The total estimated capital cost for the pipeline is $600,000 in 2009 dollars. Assuming the pipeline would be constructed in 2015, the present value total of avoided capital costs will be $423,000.

Avoided Percolation Pond O&M Costs

As noted above, with the Piru Tertiary Upgrade, VCWWD will no longer discharge to the PWWTP percolation ponds. This will result in cost savings from no longer having to operate and maintain the ponds or to monitor the groundwater beneath the ponds; O&M costs associated with the percolation ponds amount to about $15,000 per year. Over the 35-year project life, the total present value of avoided O&M costs will amount to $161,055.

Improved Groundwater Quality

The project will divert up to 560 AFY of effluent from the PWWTP's existing percolation ponds. This will improve groundwater quality by reducing the contribution of chlorides and TDS to the groundwater beneath the ponds and will

help VCWWD to meet groundwater quality objectives outlined in the current WDR.

Distribution of Project Benefits and Identification of Beneficiaries

The Piru Tertiary Upgrade will result in both local and regional water quality and other benefits, as summarized in Table 23. At the local level, VCWWD and their customers will benefit from the avoided construction costs of an MF/RO treatment facility and a new effluent conveyance pipeline, as well as avoided costs associated with the O&M of the percolation ponds. Regionally, groundwater users (including municipal, industrial, and agricultural) will benefit from improved groundwater quality.

Table 23: Project Beneficiaries Summary

Local	Regional	Statewide
VCWWD No. 16	Groundwater users in the Santa Clara River Groundwater Basins	
Community of Piru (a DAC)		-

Project Benefits Timeline Description

The Piru Tertiary Upgrade is expected to come online in 2014. For this analysis, a 35-year useful project life is assumed, thus benefits and costs are calculated through 2048 (35 years after the project comes online).

Potential Adverse Effects from the Project

Pursuant to the requirements of the California Environmental Quality Act, the County of Ventura Board of Supervisors (Board) certified a Mitigated Negative Declaration for the Piru Secondary WWTP Expansion Project in 2004. In 2008, the Board adopted an Addendum to the Mitigated Negative Declaration for the Piru Secondary WWTP Expansion Project, which also addressed the future Piru Tertiary Upgrade. Based on the Addendum to the Mitigated Negative Declaration, the Piru Tertiary Upgrade will result in no significant adverse environmental effects.

Summary of Findings

The Piru Tertiary Upgrade will result in avoided costs associated with meeting the WDR. First, as a result of the project, VCWWD will avoid wastewater discharge fines totaling more than $6,287,000 over the life of the project. In addition, VCWWD will avoid $423,000 in present value costs associated with upgrading the PWWTP's existing pipeline, which conveys treated effluent from the plant to the percolation ponds. Approximately $161,055 in O&M costs associated with the percolation ponds will also be avoided.

The project will also improve groundwater quality by reducing the contribution of chlorides and TDS to the groundwater beneath the ponds, helping VCWWD to meet groundwater quality objectives outlined in the current WDR.

This analysis of costs and benefits is based on available data and some assumptions. As a result, there may be some omissions, uncertainties, and possible biases. These issues are listed in Table 24.

Table 24: Omissions, Biases, and Uncertainties, and Their Effect on the Project

Benefit or Cost Category	Likely Impact on Net Benefits*	Comment
Avoided Wastewater Discharge Fines	++	If the RWQCB were to assess discharge fines in accordance with the WDR, it is not known what the magnitude of those fines would be. The RWQCB has the authority to charge up to $10,000 per day ($3.65 million/year) in fines. This would significantly increase the avoided costs of fines under the without project baseline.
Surface Water Quality Benefits	+	To the extent that the groundwater beneath the percolation ponds is connected to the Santa Clara River, reduced contribution of chlorides and TDS to the groundwater may result in water quality benefits for the river. The connection between surface water and groundwater in this area is uncertain.
Avoided Project Costs (Pipeline Upgrade, Avoided Percolation Pond O&M)	U	The calculation of the present value of costs is a function of the timing of capital outlays and a number of other factors and conditions. Changes in these variables will change the estimate of costs.
Project Costs	U	The calculation of the present value of costs is a function of the timing of capital outlays and a number of other factors and conditions. Changes in these variables will change the estimate of costs.

Notes:

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

References

Water Quality Enforcement Policy. November 2009. State Water Resources Control Board. Available: http://www.swrcb.ca.gov/water_issues/programs/enforcement/docs/enf_policy_final111709.pdf.

Table 16 - Water Quality and Other Expected Benefits

(All benefits should be in 2009 dollars)

Project: Ventura County Waterworks District (VCWWD) No. 16 - Piru Treatment Plant Tertiary Upgrade

(a) Year	(b) Type of Benefit	(c) Measure of Benefit (Units)	(d) Without Project	(e) With Project	(f) Change Resulting from Project (e) – (d)	(g) Unit $ Value (1)	(h) Annual $ Value (f) x (g) (1)	(i) Discount Factor (1)	(j) Discounted Benefits (h) x (i) (1)
2009								1.00	$0
2010								0.943	$0
2011								0.890	$0
2012								0.840	$0
2013								0.792	$0
2014	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.747	$408,983
2015	Avoided PWTP pipeline upgrade	2009 USD	0	$ 600,000	$ 600,000	N/A	$600,000	0.705	$423,000
	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.705	$10,575
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.705	$385,988
2016	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.665	$9,975
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.665	$364,088
2017	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.627	$9,405
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.627	$343,283
2018	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.592	$8,880
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.592	$324,120
2019	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.558	$8,370
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.558	$305,505
2020	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.527	$7,905
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.527	$288,533
2021	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.497	$7,455
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.497	$272,108
2022	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.469	$7,035
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.469	$256,778
2023	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.442	$6,630
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.442	$241,995
2024	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.417	$6,255
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.417	$228,308
2025	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.394	$5,910
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.394	$215,715
2026	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.371	$5,565
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.371	$203,123
2027	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.350	$5,250
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.350	$191,625
2028	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.331	$4,965
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.331	$181,223
2029	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.312	$4,680
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.312	$170,820
2030	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.294	$4,410
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.294	$160,965
2031	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.278	$4,170
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.278	$152,205
2032	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.262	$3,930
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.262	$143,445
2033	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.247	$3,705
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.247	$135,233
2034	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.233	$3,495
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.233	$127,568
2035	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.220	$3,300

Table 16 - Water Quality and Other Expected Benefits

(All benefits should be in 2009 dollars)

Project: Ventura County Waterworks District (VCWWD) No. 16 - Piru Treatment Plant Tertiary Upgrade

(a) Year	(b) Type of Benefit	(c) Measure of Benefit (Units)	(d) Without Project	(e) With Project	(f) Change Resulting from Project (e) – (d)	(g) Unit $ Value (1)	(h) Annual $ Value (f) x (g) (1)	(i) Discount Factor (1)	(j) Discounted Benefits (h) x (i) (1)
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.220	$120,450
2036	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.207	$3,105
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.207	$113,333
2037	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.196	$2,940
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.196	$107,310
2038	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.185	$2,775
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.185	$101,288
2039	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.174	$2,610
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.174	$95,265
2040	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.164	$2,460
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.164	$89,790
2041	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.155	$2,325
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.155	$84,863
2042	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.146	$2,190
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.146	$79,935
2043	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.138	$2,070
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.138	$75,555
2044	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.130	$1,950
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.130	$71,175
2045	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.123	$1,845
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.123	$67,343
2046	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.116	$1,740
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.116	$63,510
2047	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.109	$1,635
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.109	$59,678
2048	Avoided percolation pond O&M	2009 USD	0	$ 15,000	$ 15,000	N/A	$15,000	0.103	$1,545
	Avoided water quality fines	2009 USD	0	$ 547,500	$ 547,500	N/A	$547,500	0.103	$56,393
								Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table) Transfer to Table 20, column (f), Exhibit F: Proposal Costs and Benefits Summaries	$6,871,545

Comments: Without the project, the alternative to meet WDR requirements to avoid chloride discharge to the Santa Clara River is to construct a MF\RO factility for chloride removal. However, the disadvantaged Community of Piru would not be able to afford the cost of the MF/RO and associated brine removal costs. Therefore it is assumed that in the baseline, the RWQCB would adjust fines downward to approximately 15% of the maximum amount of $10,000 per day. This results in avoided fines of $547,500 per year. Also, without the project, t accommodate increased future wastewater flows, VCWWD will need to rebuild the 5,000-foot-long pipeline that conveys treated effluent from the plant to the percolation ponds. The diameter of the pipeline will be increased from 6 inches to 12 inches. The total estimated capital cost for the pipeline is $600,000 (2009 USD), including $100,000 in administration costs. This pipeline is assumed to be constructed in 2015, without the project. Also, with the project, VCWWD will no longer discharge to the PWWTP percolation ponds. This will result in cost savings from no longer having to operate and maintain the ponds or to monitor the groundwater beneath the ponds; O&M costs associated with the percolation ponds amount to

(1) Complete these columns if dollar value is being claimed for the benefit.

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The Nature Conservancy Natural Floodplain Protection Program (SC-7)

Summary

The Nature Conservancy (TNC) is planning to implement the Natural Floodplain Protection Program (NFPP). This program will preserve critical sections of the remaining undeveloped 500-year floodplain in the Santa Clara River Watershed (Watershed) in Ventura County by establishing a Floodplain Conservation Zone. TNC will acquire private property easements as a means to preclude future development, preserving highly productive farmland and riparian habitat along the Santa Clara River. Acquisition of easements also prevents urban development in the floodplain that leads to levee building, degraded floodplain functioning and habitat, and increased downstream flood damage.

The project is the first step in a stakeholder initiative organized under the Floodplain Working Group (FWG), which includes representatives from the Ventura County Watershed Protection District (VCWPD), Ventura County Farm Bureau (Farm Bureau), Ventura County Resource Conservation District (VCRCD), Natural Resources Conservation Service (NRCS), and TNC. The NFPP targets acquisition of 225 acres of easement of the approximately 4,100 total acres in the 500-year floodplain of the Watershed. TNC anticipates that with acquisition of sufficient easements in key areas of the 500-year floodplain, the risk of development on the remaining lands will be substantially reduced, and therefore it will not be necessary to acquire easements across the entire floodplain. Ultimately, TNC hopes to establish conservation easements to protect the 80 percent of the floodplain that is likely to be developed (approximately 3,280 acres) starting with the 225 acres targeted under this initial step. The benefits from protection will increase over time as additional acres targeted by the NFPP are acquired in the future.

A summary of all benefits and costs of the project is provided in Table 25. Water quality and other benefits are discussed in the remainder of this attachment.

Table 25: Benefit-Cost Analysis Overview

	Present Value
Costs – Total Capital and Operations and Maintenance	$3,786,300
Monetizable Benefits	
Flood Control Benefits	
Avoided Downstream Flood Damage	$9,902,622
Total Monetizable Benefits	$9,902,622
Qualitative Benefit or Cost	**Qualitative Indicator***
Water Supply Benefits	
Avoided Loss of Groundwater Recharge	+
Water Quality and Other Benefits	
Maintain Protected Riparian Habitat	++
Avoided Degradation of Water Quality	+
Protect Wetland and Riparian Habitats	++
Recovery of Endangered Southern Steelhead	++
Protect Farmland from Development	++
Provide Educational and Recreational Opportunities	+
Flood Control Benefits	
Avoided Construction Cost of New Levees	++
Avoided Maintenance Costs for New Levees	++
Avoided Upgrade Costs for Existing Levees	++

Notes:

* Direction and magnitude of effect on net benefits:

+	=	Likely to increase net benefits relative to quantified estimates.
++	=	Likely to increase net benefits significantly.
–	=	Likely to decrease benefits.
– –	=	Likely to decrease net benefits significantly.
U	=	Uncertain, could be + or –.

The "Without Project" Baseline

The NFPP will preserve floodplain lands along the Santa Clara River within Ventura County, known as the Lower Santa Clara River Watershed (Watershed). The Santa Clara River is the largest river system in Southern California that is still in a relatively natural state. The river originates on the northern slope of the San Gabriel Mountains in Los Angeles County, traverses Ventura County, and flows into the Pacific Ocean between the cities of San Buenaventura (Ventura) and Oxnard. Municipalities within the Watershed include Santa Clarita in the Los Angeles County portion, and Fillmore and Santa Paula in the Ventura County portion (RWQCB 2010a). The Cities of Oxnard and Ventura are located in the Ventura Coastal Watershed which includes the areas downstream of the Santa Clara River (RWQCB 2010b).

Extensive patches of high-quality riparian habitat exist along the length of the river and its tributaries. Two endangered fish, the unarmored three-spined stickleback and the steelhead trout, are resident in the river (LAWQCB 2010a). One of the Santa Clara River's largest tributaries, Sespe Creek, is designated a Wild Trout Stream by the State of California and a Wild and Scenic River by the U.S. Forest Service. In addition, the river serves as an important wildlife corridor. The Santa Clara River also drains to the Pacific Ocean through an estuary that supports a large variety of wildlife.

Currently, several reaches of the Santa Clara River do not meet federal water quality standards. In the lower watershed, various reaches of the river are 303(d) listed for a variety of pollutants, including: toxicity, coliform bacteria, total dissolved solids (TDS), chlorides, ammonia, nitrates, nitrites, boron, sulfates, toxaphene, chlorpyrifos, and diazinon. Several of the groundwater sub-basins in the Watershed also suffer from water quality issues. Total maximum daily loads (TMDLs) have been established for chlorides and nutrients. The chloride TMDL applies to reaches throughout most of the Watershed, while the nutrients TMDL is for impairment by ammonia in Reach 3 and by nitrate plus nitrite in Reach 7. Reach 3 is in Ventura County while Reach 7 is upstream in Los Angeles County (LARWQB 2010a).

Rapid population growth and economic development in the Watershed have led to the encroachment of development into the Santa Clara River floodplain. When this happens, levees are built and the river is channelized to reduce flooding risks to the development. This often leads to greater water velocities and more serious and extensive flooding downstream as well as increased scour and erosion. Other rivers in the region (e.g., Los Angeles, San Gabriel, Santa Ana), which are now channelized, demonstrate how urbanization of a watershed can lead to destruction of natural river functions and loss of aquatic and riparian habitat.

Without the project, urban development is expected to continue along the Santa Clara River. This will result in the conversion of farmland in Ventura County to other uses. The levee construction anticipated without this project will remove wetlands and riparian habitat, which will degrade water quality in the river. Furthermore, floodplain development will likely damage the habitat value of areas that have already been preserved under existing watershed improvement efforts (i.e., existing conservation easements under the California State Coastal Conservancy's Santa Clara River Parkway Program). If this project is not

implemented, decreased groundwater recharge (as described in Attachment 7) may exacerbate groundwater quality issues. Finally, without the project, important river-related educational and recreational opportunities will be lost.

Water Quality and Other Benefits

By preventing the development of the floodplain, building of levees, and channelization of the Santa Clara River, this project will maintain already protected riparian habitat, avoid water quality degradation under an urbanized future, prevent exacerbation of seawater intrusion, protect increasingly rare wetland and riparian habitats, assist in the recovery of the endangered southern steelhead, protect farmland from development, and provide educational and recreational opportunities.

As noted above, the benefits described below will only be partially realized through this project (225 acres out of a projected 3,280 that need to be purchased for full benefit realization). However, funding this project will provide the initial steps necessary to begin realizing these benefits, and those benefits will increase as the NFPP continues beyond the purchase of easements for the first 225 acres.

Maintain Protected Riparian Habitat

Over the last decade, multiple agencies have invested heavily in protecting the riparian areas along the Santa Clara River. For example, the California State Coastal Conservancy has spent roughly $15 million on the Santa Clara River Parkway Program, with the goal of creating a continuous band of conserved river habitat from the ocean to the confluence with Sespe Creek (California State Coastal Conservancy, 2006). TNC, the California Department of Fish and Game, and the U.S. Fish and Wildlife Service have likewise contributed to preserving locations on the river containing the highest habitat values. Today about 11 miles and 3,250 acres of riverfront properties in Ventura County are preserved. As envisioned, the Santa Clara River Parkway Program will ultimately acquire and restore a 25-mile long corridor of the Santa Clara River consisting of some 6,000 acres from the coast to Sespe Creek (Stillwater Sciences, 2008). The easements purchased as part of this project will focus on preserving farmlands within the 500-year floodplain, not just the riparian habitat zone.

Existing habitat conservation will be placed at risk if the NFPP is not implemented. Without the project, floodplain development that will occur upstream will damage the habitat values for which these properties were protected in the first place. When upstream floodplain properties are developed, this leads to higher water velocities that scour the riverbed downstream, stripping the riverbed of the vegetation necessary for fish and other species' habitat. If such development occurs upstream from currently protected lands, the habitat value of those lands will be degraded and the economic investment of conserving that land will lose value.

Due to uncertainty involving habitat degradation as a result of future floodplain development and levee building to protect it, a portion of this benefit attributable to the first 225-acre step for the NFPP is not included as a monetized benefit in this analysis. However, it is described here to provide an indication of the possible order of magnitude of this benefit.

Avoided Degradation of Water Quality

This project will contribute to maintaining water quality within the Watershed. Several reaches of the Santa Clara River do not meet federal water quality standards. In the lower Watershed, various reaches are 303(d) listed for toxicity, coliform bacteria, TDS, chloride, ammonia, nitrates, nitrites, boron, sulfates, toxaphene, chlorpyrifos, and diazinon. TMDLs have been established for chlorides and nutrients (RWQCB, 2010a). Agricultural users are currently under a mandate to lower pollutants in runoff they produce. Riparian buffers along the river and its tributaries reduce some pollutants, such as nutrients. Existing vegetated wetlands also reduce sediments and buffer many pollutants. The levee construction anticipated without this project will remove wetlands and riparian habitat, thus eliminating the natural water quality treatment function these habitats provide currently.

Furthermore, several of the groundwater sub-basins suffer from water quality issues. In the Oxnard sub-basin, nitrate concentrations can

exceed the state Maximum Contaminant Level, and elevated levels of DDT and PCB are found near Point Mugu (California Department of Water Resources, 2006a). In the Fillmore sub-basin, agricultural return flows lead to high nitrate concentrations in groundwater during dry periods. Urban stormwater runoff within the Watershed tends to concentrate salts such as chloride and other contaminants in the ground-water and soils including nitrates (California Department of Water Resources, 2004 and 2006b). Finally, in the Santa Clara River Valley East sub-basin, nitrate content and TDS can be elevated and trichloroethylene and ammonium perchlorate have been detected in four wells in the eastern part of the sub-basin (Strauss, 2007).

If this project is not implemented, decreased groundwater recharge (as described in Attachment 7), combined with current levels of groundwater extraction, will likely exacerbate these groundwater quality issues. Surface water quality will also degrade due to increased scour and sedimentation and the reduction in riparian buffer zones and the treatment they provide.

Protect Wetland and Riparian Habitats

There are a variety of riparian and wetland vegetation types in the Santa Clara River floodplain that provide habitat for a diverse assemblage of plant and animal species. The Santa Clara River supports a diversity of wildlife, including some 18 documented federal and/or state endangered or threatened species. Another 20 rare species of concern also spend at least some of their lifecycle on the river (AMEC Earth & Environmental, 2005). To put this into perspective, Yosemite National Park harbors 14 endangered or threatened species, or 4 fewer than are documented on the Santa Clara River.

Federal endangered species that are reported to occur or are considered to have potential to occur along the Santa Clara River floodplain, and thus indicate highly-valued habitat, include tidewater goby, southern steelhead trout, unarmored three-spine stickleback, arroyo toad, California red-legged frog, least Bell's vireo, southwestern willow flycatcher, California least tern, Belding's savannah sparrow, salt marsh bird's beak, Ventura marsh milkvetch, slender-horned spineflower, and Nevin's barberry. Federal threatened species that are reported to occur or are considered to have potential to occur along the Santa Clara River floodplain include the Santa Ana sucker and the western snowy plover. Federal species of special concern that are reported to occur or are considered to have potential to occur along the Santa Clara River floodplain include sandy beach tiger beetle, southwestern pond turtle, silvery legless lizard, loggerhead shrike, white-tailed kite, western least bittern, long-billed curlew, elegant tern, white-faced ibis, bank swallow, Townsend's big-eared bat, and western mastiff bat (AMEC Earth & Environmental, 2005).

Permanently protecting the floodplain will eliminate the need for future levee construction. Levee construction will displace large areas of aquatic and riparian habitat. In addition, levees will alter the natural river hydrology in a way that can lead to scour damage to the riverbed and banks. This will harm downstream habitat not directly impacted by levee construction. According to a report for the Santa Clara River Parkway, “the highest priority restoration sites within the lower Santa Clara River floodplain corridor are Reaches 6 and 11, and lower Piru Creek…[which] provide potential habitat for the greatest number of focal species…and the greatest potential habitat areas” (Stillwater Sciences, 2007). The NFPP will help to protect these high-priority areas and their critical wetland and riparian habitat.

Recovery of Endangered Southern Steelhead

The National Oceanographic and Atmospheric Administration (NOAA) Fisheries listed the southern steelhead trout as endangered in 1997 and is responsible for its recovery. The NOAA Fisheries recovery plan for the steelhead identifies the Santa Clara River as a high priority in the recovery of the species (National Oceanic and Atmospheric Administration, 2009).

Maintaining natural flow timing and duration are critical factors for steelhead migration and thus their overall recovery. Conservation of the floodplain is necessary to maintain these

natural conditions. According to the Santa Clara River Focal Species Report, "Steelhead historically spawned and reared in tributaries of the lower Santa Clara River basin, downstream of the Santa Clara River and Piru Creek confluence" (Stillwater Sciences, 2007). Steelhead in particular generate broad public interest as a charismatic species valued by environmentalists, recreational anglers, and the broader public. While migration barriers pose a significant threat to the steelhead, the only unregulated and potentially accessible spawning tributary available to steelhead is Sespe Creek. A large amount of the anticipated development along the Santa Clara River will directly impact the river stretch from the coast to Sespe Creek – either through development of the floodplain directly, through scour damage to habitat due to higher water velocities from upstream floodplain development, or through decreased summer base flows, which are critical to steelhead rearing. Consequently, the floodplain protection envisioned in this project is critical to achieving recovery of the southern steelhead.

Protect Farmland From Development

This project will provide direct financial incentives to conserve farmland, which is a $1.6 billion industry in Ventura County (County of Ventura, 2010). Ventura County is the ninth most agriculturally productive county in the State of California and the 10th most productive in the nation. As discussed in the "Without-Project Baseline" discussion, development of agricultural land has already accelerated, and a significant amount of agricultural land is anticipated to be lost to suburban development in the coming years. Sale of inundation and development rights reduces the market value of a property, thereby reducing associated tax liability, and providing income that could prove critical to keeping many local farmlands productive. Purchasing development rights in the Santa Clara River floodplain will also protect agriculture in the Santa Clara River valley as a long-term economically viable use of the land.

Provide Education and Recreation Opportunities

The long-term conservation of the Santa Clara River will provide increasing education and recreation opportunities. The 3,250 acres of the river that have been conserved to date have made it more accessible for these uses, but the additional 225 acres conserved by this project, as well as future conservation projects, will enhance these benefits. TNC provides access to its properties for local school children to enhance their science studies. Furthermore, the University of California is in the process of establishing a UC Research Station on the river that will be located on newly conserved floodplain land. This facility will provide students and researchers from around the world a laboratory to study river systems. Levee construction will eliminate the very purpose for which these researchers, students, and citizens come to the river.

The Santa Clara River has also been designated an "Important Bird Area" by the Audubon Society because of its abundant bird habitat. The river is regularly visited by birders and birding groups.

Without the NFPP, these increased educational and recreational opportunities will be lost.

Distribution of Project Benefits and Identification of Beneficiaries

The NFPP includes the full range of types of beneficiaries, as summarized in Table 26. First, direct purchase of conservation easements provides a financial benefit to farmers – a $1.6 billion industry in Ventura County, as well as organizations that support them, such as the Farm Bureau. Avoiding a loss of surface water and groundwater quality will benefit the cities of Ventura, Oxnard, Santa Paula, and Fillmore, as well as farmers in the Santa Clara River Valley, and United Water Conservation District. The California State Coastal Conservancy, California Department of Fish and Game, and the U.S. Fish and Wildlife Service will all benefit from the NFPP as it protects their investment in the Santa Clara River Parkway Program. Furthermore, the habitat, open space, recreation, and endangered species benefits of this program may be valued by citizens across the region, state, and nation.

Table 26: Project Beneficiaries Summary

Local	Regional	Statewide
Local farmers	United Water Conservation District	The California State Coastal Conservancy
City of Ventura	Ventura County Farm Bureau	
City of Oxnard	Southern Californians interested in the natural and recreation values provided by the last relatively pristine river in southern coastal California	California Department of Fish and Game
City of Fillmore		
City of Santa Paula	Threatened and Endangered Species in the Watershed particularly Southern Steelhead Trout	Californians interested in the natural and recreation values provided by the last relatively pristine river in southern coastal California

Project Benefits Timeline Description

This project is assumed to be executed over an 18-month timeframe from July 2011 through December 2012. It is anticipated that easements will be acquired in calendar year 2012.

The benefits described in this attachment will only be partially realized with the 225 acre easement purchase. Because 3,280 acres of remaining undeveloped floodplain must be purchased to fully realize these benefits, this project is apportioned credit for 6.86 percent of the benefits described herein. The remainder of the benefits require further purchases to prevent further floodplain development and loss of natural floodplain functioning and habitat.

Potential Adverse Effects from the Project

This project is exempt under CEQA under two categories: Acquisition for Wildlife Conservation Purposes (Class 13) and Open Space Contracts of Easements (Class 17). There are no adverse effects anticipated from this project.

Summary of Findings

The project also provides a range of qualitatively-assessed water quality and other benefits (Table 27). More than $15 million has already been invested in maintaining protected riparian habitat. This project is a necessary beginning to ensuring that this investment is maintained into the future. Water quality impairment can be avoided by maintaining riparian buffers along the river, as well as vegetated wetlands to reduce sediments and buffer many pollutants.

Furthermore, several of the Santa Clara River Watershed groundwater sub-basins suffer from water quality issues that may be exacerbated by decreased groundwater recharge (as described in Attachment 7). This project will preserve large amounts of habitat for 18 documented federal and/or state endangered or threatened species and some 20 rare species of concern. One species of particular concern is the southern steelhead, for which NOAA Fisheries identified the Santa Clara River as high priority habitat for species recovery. Engaging in a floodplain conservation ease-ment program will also protect valuable farmland and ensure that the nation's ninth most productive agricultural county can keep agriculture as an economically viable activity in the face of suburban development pressure. Finally, the land protected by this project will provide enhanced education and recreational values for the public at large and the Santa Clara River UC Research Station in particular.

Table 27: Qualitative Benefits Summary – Water Quality and Other Benefits

Benefit	Qualitative Indicator*
Maintain Protected Riparian Habitat	++
Avoided Degradation of Water Quality	+
Protect Wetland and Riparian Habitats	++
Recovery of Endangered Southern Steelhead	++
Protect Farmland from Development	++
Provide Recreational and Educational Opportunities	+

Notes:

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.

This analysis of benefits is based on available data and some assumptions. As a result, there may be some omissions, uncertainties, and possible biases. In this analysis, there are no quantitative or monetized benefits calculated. As a consequence, there are no identifiable biases or uncertainties in water quality and other benefits of this project.

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Ojai Valley Land Conservancy Ojai Meadows Ecosystem Restoration Final Phase (V-5)

Summary

The Ojai Valley Land Conservancy (OVLC) Ojai Meadows Ecosystem Restoration Final Phase restores upland and transitional habitats to prevent soil erosion and sedimentation into recently restored wetlands and establishes appropriate plant density in those wetland habitats at the Ojai Meadows Preserve (OMP). The overall OMP is designed to resolve flooding problems on State Highway 33 and at Nordhoff High School, while providing a variety of ancillary benefits. The initial phase modified the site topography to direct stormwater from three adjacent sites into a variety of wetland channels and pools in order to prevent flooding on nearby properties, allow stormwater contaminants to break down through natural processes, promote water infiltration to recharge groundwater, and provide habitat for plants, amphibians, birds, and other wildlife.

The Final Phase of the OMP Ecosystem Restoration will add 41 acres of upland and transitional habitats to complement the wetland features and place the wetlands in an ecological context that is self-sustaining. This phase is critical, not just to finish the project, but also to protect the flood control, groundwater recharge, and stormwater contaminant filtration benefits produced by the initial phase. After earth moving was completed, the area outside of the wetland habitat was colonized by invasive weed species with shallow root systems that are not particularly effective at holding soil in place. If this problem is not addressed, sedimentation of the riparian areas and wetlands will require periodic dredging and habitat rehabilitation in order to maintain the benefits already realized through the initial phase. This project will restore the weed-infested upland areas of OMP by planting 20 acres of native grasslands and valley oak savannah vegetation, 20 acres of coast live oak woodlands, and 1 acre of coastal sage scrub in habitat transition areas.

This phase will also include additional riparian plantings, as necessary, in the wetlands areas along the drainage channels to establish appropriate plant densities. The restored native oak and grassland habitats are important to the ecological functioning of the site because they reduce sedimentation issues in the wetlands; provide the vertical structure and hunting areas necessary for sustainable bird populations; and improve the aesthetic, recreational, and educational value of the OMP.

A summary of all benefits and costs of the project is provided in Table 28. Water quality and other benefits are discussed in the remainder of this attachment.

Table 28: Benefit-Cost Analysis Overview

	Present Value
Costs – Total Capital and Operations and Maintenance	$514,327
Monetizable Benefits	
Flood Control Benefits	
Avoided Dredging to Maintain Flood Control Improvements	$342,244
Total Monetizable Benefits	$342,244
Qualitative Benefit or Cost	**Qualitative Indicator***
Water Supply Benefits	
Maintained and Enhanced Groundwater Recharge	+
Water Quality and Other Benefits	
Maintained Wetland and Riparian Habitat	+
Enhanced Upland Habitat	++
Potential Special Status Species Habitat	+
Increased Greenhouse Gas Sequestration	+
Reduced Invasive Weed Infestations	++
Improved Stormwater Quality	+
Enhanced Recreational Opportunities	+

Notes:

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

The "Without Project" Baseline

The OMP Ecosystem Restoration is located between the community of Meiners Oaks and the City of Ojai, in the Ventura River Watershed (Watershed). This coastal Watershed is located in the northwestern portion of Ventura County and drains a 228-square mile area, roughly half of which is on U.S. Forest Service land. The surface water in the Watershed generally flows in a southerly direction to an estuary located at the mouth of the Ventura River. Topography in the Watershed is rugged, and the Watershed has very steep gradients. Most rain falls during few storms that occur between November and March, while summer and fall months are typically dry. Although snow occurs at higher elevations, melting snowpack does not sustain significant runoff in warmer months. The erratic weather pattern, coupled with the steep gradients throughout most of the Watershed, results in high flow velocities, with most runoff reaching the ocean.

Beneficial uses within the Watershed upstream of the estuary include municipal supply, industrial service supply, industrial process supply, agricultural supply, contact and non-contact water recreation, warm-water habitat, wildlife habitat, preservation of rare and endangered species, migratory and spawning habitat, wetlands habitat, cold-water habitat, groundwater recharge, and freshwater replenishment. Beneficial uses in the estuary include navigation, commercial fishing and sport fishing, estuarine habitat, marine habitat, preservation of rare and endangered species, wildlife habitat, contact and noncontact water recreation, migratory and spawning habitat, wetlands habitat, and shellfish harvesting.

Although much of the water quality is considered good, the Watershed has been

degraded, particularly in the lower areas, by both nonpoint and point sources. Nonpoint sources include urban runoff, road building, agriculture and grazing (including confined animal facilities), air deposition, and recreation. Portions of the Ventura River downstream of the project site are on the U.S. Environmental Protection Agency's 303(d) list of impaired water bodies due to algal growth (RWQCB, 2010).

The initial phase of the OMP Ecosystem Restoration eliminated frequent flooding on the adjacent section of State Highway 33 and Nordhoff High School by modifying the topography to direct stormwater from three adjacent sites into a variety of wetland channels and pools. These wetlands also provide stormwater quality improvements, new habitats, and groundwater recharge benefits. However, because the upland areas had to be disturbed during the grading activities, the OMP has been infested with weeds that do not hold the soil in place. If this situation is not resolved, many of the benefits of the initial phase will be degraded or negated entirely. Without the Final Phase of the OMP Ecosystem Restoration, maintaining these benefits in the face of sedimentation from upland areas would require periodic dredging and restoration of the wetlands at significant cost. All 41 acres of the project site outside the wetlands and riparian corridors are currently infested with weeds and/or non-native vegetation and would remain that way without the project.

Water Quality and Other Benefits

By improving the upland habitat in the OMP, this project will maintain the restored wetland and riparian habitats, provide new upland and transitional habitat, sequester CO_2, reduce invasive weed infestations, and improve storm-water quality. None of these benefits are monetizable. However, these qualitative benefits are linked to the monetary benefits described in Attachment 9 insofar as dredging would be needed to maintain the habitat and stormwater quality benefits provided by the initial phase of the OMP Ecosystem Restoration.

Maintained Wetland and Riparian Habitat

As part of the initial phase of the OMP Ecosystem Restoration, several wetland and riparian habitats were created. This includes approximately 3 acres of seasonal marsh savannah, a perennial wetland pool, two vernal pools, and a series of holding ponds on the upland portions of the site, as well as several riparian channels planted with wetlands vegetation. These drainage channels may require additional plantings to achieve appropriate plant densities.

This project will benefit the habitats created in the initial phase of the OMP Ecosystem Restoration in two ways. First, the Final Phase of the OMP Ecosystem Restoration will include seasonal care of native plants installed along drainage channels, including weed management and preservation on sections of the wetland channels that will have been planted in winter 2010 and spring 2011. Replanting will be undertaken as needed to meet performance standards for restoration. Until these riparian plants are well-established, they are vulnerable to competition from non-native species. Second, this project will reduce sedimentation that can fill in the riparian channels, wetlands, and pools. If these upland areas are not restored through this project, many of the habitat benefits generated in the initial phase of the OMP Ecosystem Restoration will be degraded or negated entirely.

Enhanced Upland Habitat

In the Final Phase of the OMP Ecosystem Restoration, OVLC will enhance the 41 acres of upland and transitional habitats to complement the wetland features and place the wetlands in an ecological context that is self-sustaining and augments the benefits of the initial phase. This will include 20 acres of native grasslands and valley oak savannah vegetation, 9 acres of dense coast live oak woodland, 11 acres of scattered live oak savannah habitat, and 1 acre of coastal sage scrub to be planted in habitat transition areas. The native oak and grassland habitats are important to the ecological functioning of the site as a whole because they provide the vertical structure and hunting areas necessary for sustainable bird populations. Quality upland habitat is critical to making the

wetlands self-sustaining and developing a diverse, natural ecosystem hospitable to native plants and wildlife.

Potential Special Status Species Habitat

In addition, the OMP could provide suitable habitat for four special status plant species listed in the Department of Fish and Game Natural Diversity Data Base, including Miles's milk vetch, Davidson's Saltscale, Sanford's arrowhead, and Salt Spring Checkerbloom, all of which are found within a five mile radius of the project site. Naturally occurring seed transfer could result in these species taking root at the OMP.

Increased Greenhouse Gas Sequestration

This project will result in the sequestration of carbon dioxide (CO_2), a greenhouse gas that leads to global warming. By revegetating a currently weed-infested area with native vegetation, CO_2 will be removed from the atmosphere as the newly planted trees and native grasses grow and incorporate atmospheric CO_2 into biomass. Although individual plants die and decompose, grasslands and forests eventually reach steady states in which the amount of CO_2 released by dying plants is offset by new plants.

Sequestration is substantially higher during the early growth years and levels out as plants mature. Forests annually sequester between 1.0 and 2.5 tons of CO_2 per acre depending upon vegetation type and climate; perennial grasses sequester between 0.3 and 2.5 tons per acre but do not continue to sequester CO_2 annually (FHWA, 2008). Assuming average values from these estimates, the 20 acres of planted grasslands will sequester approximately 28 tons of CO_2 and the 20 acres of oak forests planted on the OMP will yield 35 tons of CO_2 sequestered annually. Assuming a 50-year life for the habitat restoration, this project will sequester 1,778 tons of CO_2 over the project life.

Reduced Invasive Weed Infestations

A major focus of this project is manual and mechanical weed management in preparation for revegetation with native plants and the broadcasting of native grass seeds. Common invasive species on the site slated for removal include eucalyptus trees, lotus trees, pepper trees, arundo donax, yellow star thistle, Bermuda grass, and fennel. Weed management will provide benefits for the 41 acres of upland habitat on site, as well as for areas downstream, by reducing the availability of seeds and cuttings and thereby reducing the rapid spread of invasive species such as arundo along riparian areas, creeks, and rivers. Weed control at this site will reduce a potential source of nuisance species for many downstream and adjacent areas. As described earlier, replacing invasive weeds with native vegetation also significantly improves the habitat value of the site.

Improved Stormwater Quality

The OMP site receives stormwater runoff from a number of nearby and adjacent developed properties. Wetlands are known for their pollution-buffering capacity, and the OMP wetlands are no exception. The wetlands will reduce pollution entering the Ventura River by metabolizing nutrients and other pollutants and will also protect the Ventura River from impacts associated with erosion and sedimentation. Reduction of nutrients in stormwater runoff is important in reducing algal growth downstream, as indicated in the 303(d) listing of the Ventura River and eutrophication in the estuary.

Although the OMP wetlands have already been constructed, enhancing the upland habitat will increase water infiltration into soils and increase stormwater filtration prior to stormwater reaching the wetlands. Furthermore, the current pollution-buffering capacity of the OMP wetlands and riparian areas will be substantially impaired over time if the upland areas are not restored because the current weedy vegetation has shallow root systems that do not effectively hold soil in place. Over time, sedimentation from rain events will fill the wetlands and riparian habitat and reduce or eliminate the stormwater filtration benefits that have accrued from the initial phase of the OMP Ecosystem Restoration.

Enhanced Recreational Opportunities

The OMP currently provides 9,500 feet of earthen trails that are open to the public. The

vertical structure of trees and grasslands to be added under the Final Phase of the OMP Ecosystem Restoration will attract birds and other wildlife, providing further recreational opportunities for wildlife viewing from existing trails in this popular preserve. In addition, the coast live oak woodlands will provide shaded areas, making the preserve especially attractive during the warm summer months.

Distribution of Project Benefits and Identification of Beneficiaries

Table 29 shows the range of water quality and other beneficiaries from the project. The OVLC owns the OMP. The water quality and other benefits accrue to downstream communities on the Ventura River and to the Ventura County Watershed Protection District.

Table 29: Project Beneficiaries Summary

Local	Regional	Statewide
Ojai Valley Land Conservancy	Ventura County Watershed Protection District	
Downstream Communities	Visitors from Southern California	–

Project Benefits Timeline Description

This project will be executed over a 36-month time frame from June 2011 through May 2014. Habitat restoration is an intensive activity that must consider the life cycle of both weed species and the native vegetation to ensure an efficaciously restored habitat. The project will first focus on managing weeds, removing non-native woody species, and managing the weed seedbank through mechanical and manual techniques.

Application of native grass and wildflower seeds will begin in 2012 depending upon weed management success. This will be followed by planting of the potted plant stock to establish the desired habitats. Together, these plantings will establish vegetation that will provide erosion control and prevent sedimentation of the restored wetlands. Weed management will continue throughout the project's assumed 50-year lifetime and likely for many years beyond. Most project benefits will be realized very quickly after native plants begin to recolonize the area. However, some benefits will be realized over time as the plants mature and the habitat becomes fully established.

Potential Adverse Effects from the Project

A Final Initial Study/Mitigated Negative Declaration (IS/MND) was prepared to comply with CEQA (Rincon Consultants, Inc., 2007). The IS/MND found that there are no adverse effects anticipated from this project.

Summary of Findings

The project will provide a range of both water quality and other benefits as summarized in Table 30. Reduced sedimentation from upland areas will protect and enhance the wetland and riparian habitats constructed in the initial phase. Sedimentation will be reduced by restoring habitat upland from the wetland, including 20 acres of native grasslands and valley oak savannah vegetation, 9 acres of dense coast live oak woodland, 11 acres of scattered live oak savannah habitat, and 1 acre of coastal sage scrub, all of which will be planted in habitat transition areas. The growth of this new habitat will sequester 1,178 tons of CO_2 over the lifetime of this project. Preparation of the area for habitat restoration and maintenance of the new habitat over the first several years will require intensive weed management on the 41-acre project site. This will enhance the habitat values of the OMP and also reduce a source of nuisance species for many downstream and adjacent areas.

The OMP receives stormwater from several neighboring developed properties. The OMP wetlands will reduce pollution entering the Ventura River by metabolizing nutrients and other pollutants and will protect the Ventura

River from impacts associated with erosion and sedimentation. Finally, the added grassland and oak habitats will attract wildlife and add shade to the OMP, enhancing the recreational opportunities and value along existing trails. None of these benefits could be monetized. However, several of them do share in the monetary benefits described in Attachment 9 insofar as dredging would be needed to maintain the habitat and stormwater quality benefits provided by the initial phase of the OMP Ecosystem Restoration in the absence of funding and implementing the Final Phase.

Table 30: Qualitative Benefits Summary – Water Quality and Other Benefits

Benefit	Qualitative Indicator*
Maintained Wetland and Riparian Habitat	+
Enhanced Upland Habitat	++
Potential Special Status Species Habitat	+
Increased Greenhouse Gas Sequestration	+
Reduced Invasive Weed Infestations	++
Improved Stormwater Quality	+
Enhanced Recreational Opportunities	+

Notes:

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.

This analysis of costs and benefits is based on available data and some assumptions. As a result, there may be some omissions, uncertainties, and possible biases. The water quality and other benefits identified in this analysis could not be monetized. The benefit of the sequestration of CO_2 is uncertain because the exact amount of sequestration to be expected from the specific habitat types, the change in sequestration over time as the habitat matures, and the project lifetime are all potentially variable. Some of the uncertainties associated with this benefit are listed in Table 31.

Table 31: Omissions, Biases, and Uncertainties, and Their Effect on the Project

Benefit or Cost Category	Likely Impact on Net Benefits*	Comment
Exact Sequestration by Habitat Type	U	Sequestration by the specific habitat types for this project could be slightly higher or slightly lower than those cited for “forests” and “grasslands” in the analysis.
Change in Sequestration over Time	U	Although biomass generally sequesters more CO_2 during early development and less as the plants mature, any deviations are expected to average out over the lifetime of the project.
Duration of Sequestration Benefits	+	A 50-year lifetime was assumed for the project and thus for the sequestration benefits associated with the project. However, oak trees mature slowly and may provide benefits over a longer time frame.

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
U = Uncertain, could be + or –.

References

Carbon Sequestration along Highway Rights of Way: Piloting a Concept. September 2008. United States Department of Transportation, Federal Highway Administration. Available: http://www.environment.fhwa.dot.gov/strmlng/newsletters/sep08nl.asp.

Watershed Management Initiatives. Ventura River Watershed Summary. 2010. Los Angeles Regional Water Quality Control Board. Available: http://www.swrcb.ca.gov/rwqcb4/water_issues/programs/regional_program/wmi/ws_ventura.shtml.

Table 16 - Water Quality and Other Expected Benefits

(All benefits should be in 2009 dollars)

Project: OVLC Ojai Meadows Ecosystem Restoration Final Phase (V-5)

(a) Year	(b) Type of Benefit	(c) Measure of Benefit (Units)	(d) Without Project	(e) With Project	(f) Change Resulting from Project (e) – (d)	(g) Unit $ Value (1)	(h) Annual $ Value (f) x (g) (1)	(i) Discount Factor (1)	(j) Discounted Benefits (h) x (i) (1)
2009	Carbon Sequestration	tons of CO2	0	0	0	$0			
2010	Carbon Sequestration	tons of CO2	0	0	0	$0			
2011	Carbon Sequestration	tons of CO2	0	0	0	$0			
2012	Carbon Sequestration	tons of CO2	0	49	49	$0			
2013	Carbon Sequestration	tons of CO2	0	49	49	$0			
2014	Carbon Sequestration	tons of CO2	0	35	35	$0			
2015	Carbon Sequestration	tons of CO2	0	35	35	$0			
2016	Carbon Sequestration	tons of CO2	0	35	35	$0			
2017	Carbon Sequestration	tons of CO2	0	35	35	$0			
2018	Carbon Sequestration	tons of CO2	0	35	35	$0			
2019	Carbon Sequestration	tons of CO2	0	35	35	$0			
2020	Carbon Sequestration	tons of CO2	0	35	35	$0			
2021	Carbon Sequestration	tons of CO2	0	35	35	$0			
2022	Carbon Sequestration	tons of CO2	0	35	35	$0			
2023	Carbon Sequestration	tons of CO2	0	35	35	$0			
2024	Carbon Sequestration	tons of CO2	0	35	35	$0			
2025	Carbon Sequestration	tons of CO2	0	35	35	$0			
2026	Carbon Sequestration	tons of CO2	0	35	35	$0			
2027	Carbon Sequestration	tons of CO2	0	35	35	$0			
2028	Carbon Sequestration	tons of CO2	0	35	35	$0			
2029	Carbon Sequestration	tons of CO2	0	35	35	$0			
2030	Carbon Sequestration	tons of CO2	0	35	35	$0			
2031	Carbon Sequestration	tons of CO2	0	35	35	$0			
2032	Carbon Sequestration	tons of CO2	0	35	35	$0			
2033	Carbon Sequestration	tons of CO2	0	35	35	$0			
2034	Carbon Sequestration	tons of CO2	0	35	35	$0			
2035	Carbon Sequestration	tons of CO2	0	35	35	$0			
2036	Carbon Sequestration	tons of CO2	0	35	35	$0			
2037	Carbon Sequestration	tons of CO2	0	35	35	$0			
2038	Carbon Sequestration	tons of CO2	0	35	35	$0			
2039	Carbon Sequestration	tons of CO2	0	35	35	$0			
2040	Carbon Sequestration	tons of CO2	0	35	35	$0			

Table 16 - Water Quality and Other Expected Benefits

(All benefits should be in 2009 dollars)

Project: OVLC Ojai Meadows Ecosystem Restoration Final Phase (V-5)

(a) Year	(b) Type of Benefit	(c) Measure of Benefit (Units)	(d) Without Project	(e) With Project	(f) Change Resulting from Project (e) – (d)	(g) Unit $ Value (1)	(h) Annual $ Value (f) x (g) (1)	(i) Discount Factor (1)	(j) Discounted Benefits (h) x (i) (1)
2041	Carbon Sequestration	tons of CO2	0	35	35	$0			
2042	Carbon Sequestration	tons of CO2	0	35	35	$0			
2043	Carbon Sequestration	tons of CO2	0	35	35	$0			
2044	Carbon Sequestration	tons of CO2	0	35	35	$0			
2045	Carbon Sequestration	tons of CO2	0	35	35	$0			
2046	Carbon Sequestration	tons of CO2	0	35	35	$0			
2047	Carbon Sequestration	tons of CO2	0	35	35	$0			
2048	Carbon Sequestration	tons of CO2	0	35	35	$0			
2049	Carbon Sequestration	tons of CO2	0	35	35	$0			
2050	Carbon Sequestration	tons of CO2	0	35	35	$0			
2051	Carbon Sequestration	tons of CO2	0	35	35	$0			
2052	Carbon Sequestration	tons of CO2	0	35	35	$0			
2053	Carbon Sequestration	tons of CO2	0	35	35	$0			
2054	Carbon Sequestration	tons of CO2	0	35	35	$0			
2055	Carbon Sequestration	tons of CO2	0	35	35	$0			
2056	Carbon Sequestration	tons of CO2	0	35	35	$0			
2057	Carbon Sequestration	tons of CO2	0	35	35	$0			
2058	Carbon Sequestration	tons of CO2	0	35	35	$0			
2059	Carbon Sequestration	tons of CO2	0	35	35	$0			
2060	Carbon Sequestration	tons of CO2	0	35	35	$0			
2061	Carbon Sequestration	tons of CO2	0	35	35	$0			
Project Life	Carbon Sequestration	tons of CO2			1,778			…	
							Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table) Transfer to Table 20, column (f), Exhibit F: Proposal Costs and Benefits Summaries		$0

Comments: Carbon sequestration benfits were calculated by assuming average values from available estimates for perennial grasses and riparian oak forests. The 20 acres of restored perennial grasses will sequester approximately 28 tons of CO2, split between the first two years of restoration as these habitats develop quickly. The 20 acres of oak forests will yield 35 tons of CO2 sequestered annually.